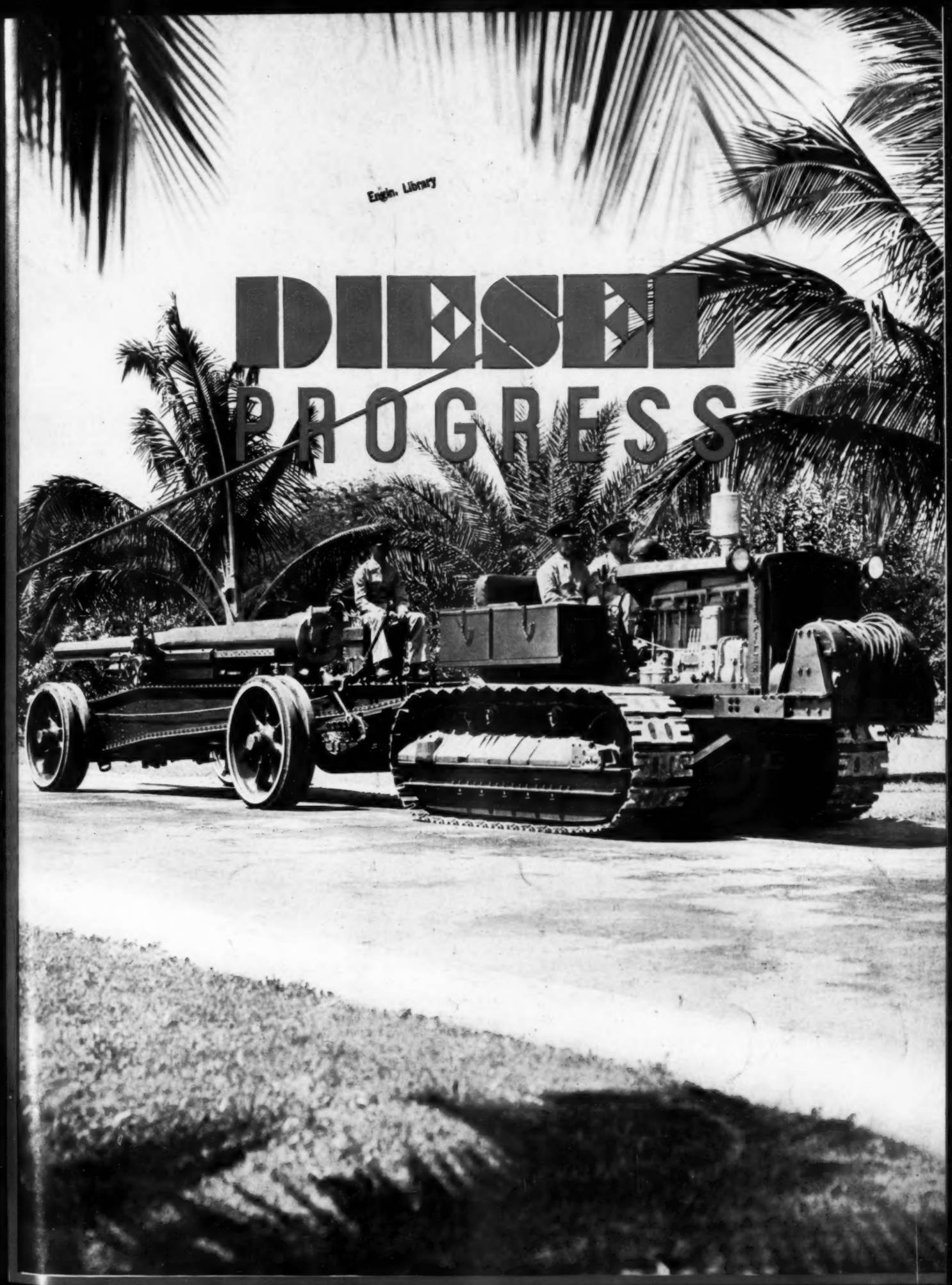

DIESEL PROGRESS

APRIL, 1941

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DIESEL and GAS ENGINE PROGRESS

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: Moving a 14½ ton gun from one location to another is one of the many jobs this 75 hp. Caterpillar Diesel tractor, owned by the U. S. Army, has to do. This unit is assigned to Fort Kamehameha, Oahu, Territory of Hawaii.

TABLE OF CONTENTS ILLUSTRATION: A new Mack-Lanova Diesel towing and hauling unit recently added to the Cities Service Company Co., Inc., truck fleet. It is used for local deliveries in the vicinity of Newark, New Jersey, and is transporting 5,600 gal. of fuel oil per trip, averaging five miles per gallon of fuel.

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KENNETH CAMPBELL
Art Director

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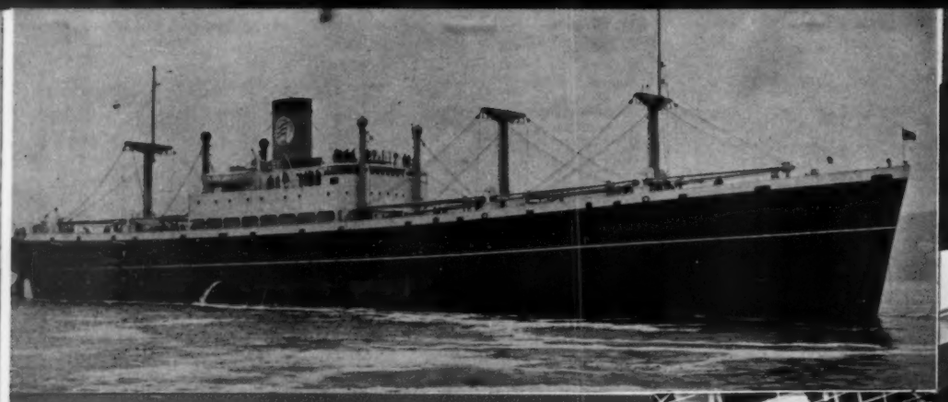

By CHAS. F. A. MANN

NEARLY sixteen years ago, the S. S. "Bienville" was completed at the old World War Todd Shipbuilding Corporation plant at Tacoma, the last of a motley assortment of splendid merchant and naval ships built during the six year life of that famed Wartime yard magnificently located on Commencement Bay, with eight miles of deep water right off the launching ways.

Weeds and desolation marked the gradual "folding" of that huge plant, and for fourteen years after that fine Southern Pacific Steamship Co. passenger ship sailed away to join the Morgan Line fleet between New York and New Orleans, not a single large steel ship was built on Puget Sound. During that interval, the Diesel engine emerged from a clouded status and took its place as an economical prime mover of ships.

Sixteen months before *Cape Alava* was finished and sailed away proudly to join the new American Mail Line fleet in Oriental-Pacific Coast service, the Maritime Commission completed plans for the first C-1-B Motorships. Still the old Shipyard site was weeds and desolation —right to the day when word came that the Seattle-Tacoma Shipbuilding Corporation had been organized by the Todd Shipyard Corp. of New York, to establish again steel shipbuilding on a large scale on Puget Sound. Following closely on this stirring news was the announcement that the new Corporation, headed by fiery, skillful R. J. Lamont, would build a fleet of five C-1-B twin-engined motorships as their first order. *Cape Alava*, the first of this beautiful fleet of economical freighters, was launched barely eleven months from the time the ground was broken for the new shipyard.

So, the great cycle of Progress was completed March 18, when *Cape Alava*, the first Maritime Commission C-1-B Diesel ship, was off to her Builders Trials. The last ship to be built on Puget Sound was a steamship; the first, under the New Order of things, is a motorship, a compact 100% Diesel-operated, 90% welded steel cargo vessel costing just over $2,000,000, which will earn money for her owners and will be the pride and joy of her crew.

Five ships will carry identical machinery: two compact, 6 cylinder, 2160 hp. Hamilton Diesels driving a single propeller through Westinghouse Electric couplings and gearing: two 525 hp. Washington Diesel auxiliaries to carry the big electric load. Three of the ships will go to American Mail Line for Oriental service, and two will go to the Alcoa Steamship Company to haul aluminum ore between the Gulf and the Columbia River. All will be delivered by the end of 1941, twenty-six months from the very day the shipyard was started by the first hammer blows of a piledriver!

With the brainwork of the yard directed by Walter L. Green, the shipyard crew was recruited from eleven western states to learn the welding technique; materials and equipment rounded up from the whole of the U. S. A. *Cape Alava* and the four trim sisterships represent a tribute to American organizing genius.

It is all right to boast of records on the Atlantic Coast, where every phase of shipbuilding is handily located and in limitless quantities, but to do this same job in the remote far Northwest corner of the U.S.A. in twenty-six months deserves the attention and praise of the Shipping and Engineering world, especially when hay grew where *Cape Alava's* keel was laid as late as September, 1939 . . . ! !

The principal characteristics of the *Cape Alava* are:

Length, Overall	416 ft. 0 in.
Length, B. P.	395 ft. 6 in.
Breadth, Molded	60 ft. 0 in.
Draft, loaded	27 ft. 6 in.
Depth, Molded, to Main Deck	37 ft. 6 in.
Speed	14 knots
Crew, 41; Passengers, 8; Spares, 6	
Light	3,900 tons
Fuel	759 tons
Fresh Water	303 tons
Stores	35 tons
Cargo	7,878 tons
Deadweight	8,975 tons
Displacement Tonnage	12,875 tons

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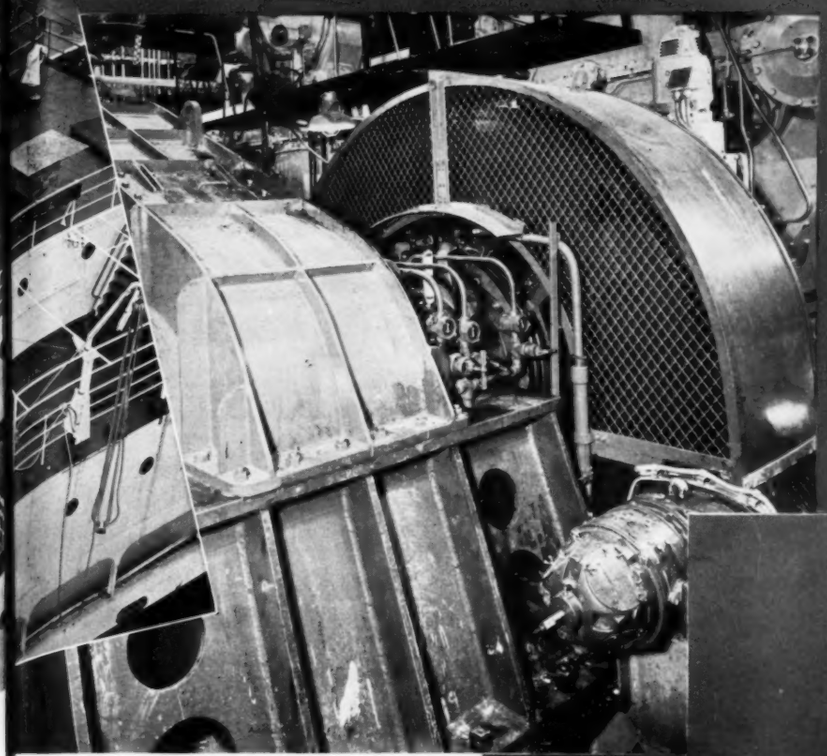
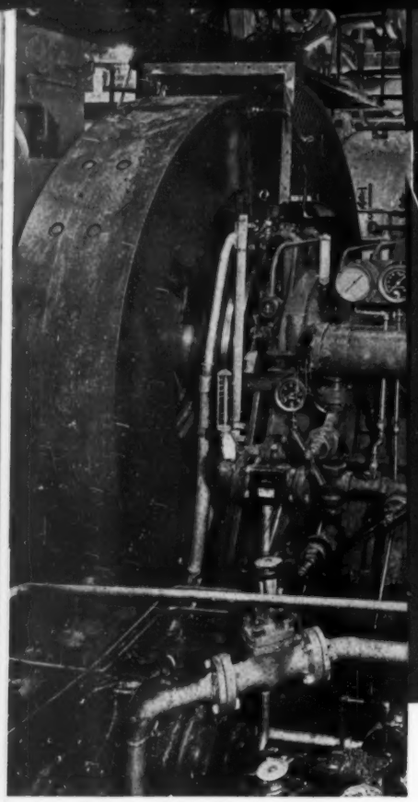
CAPE ALAVA COMPLETED AT TACOMA

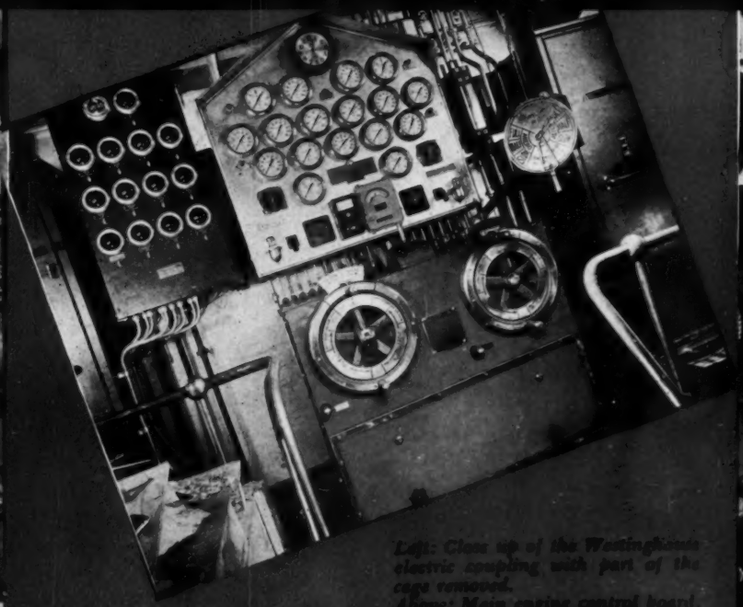


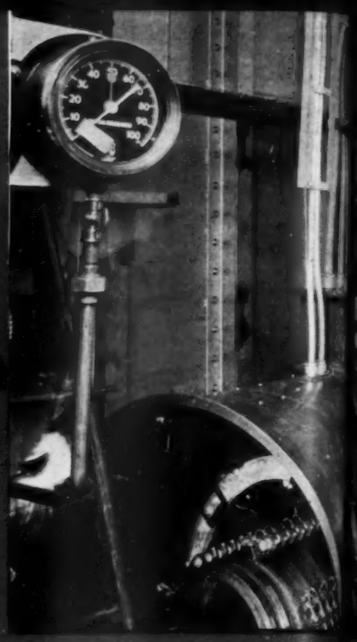
Close up of Westinghouse reduction gear and one Westinghouse electric coupling. Above right: Mr. Murphy of Westinghouse checking the quiet action of the reduction gear.

The propulsion engines are two Hamilton 6 Cylinder Diesels, 21½ in. bore x 27½ in. stroke. developing 2160 hp. (Max. 2620 hp.) each, at 233 rpm. (Normal). The auxiliary engines are two Washington 4 Cycle, 6 cylinder Diesels, 12¾ in. bore x 16 in. stroke, developing 525 hp. at 450 rpm., turning 275 kw., 120/240 volt D.C. General Electric generators. All auxiliary deck & engine room machinery is 100% electrified. Main Diesels turn a single propeller 90 rpm. through Westinghouse Electric couplings and a single reduction, double helical reduction gear.

The ship is of the flush deck, full scantling design, with raked stem and cruiser stern, giving her trim, beautiful lines. Construction of the ship is 90% welded steel, with unusual technique employed in pre-fabrication of tanks, double bottom framing, bulkheading, deckhouse parts, masts, booms, stack and even engine foundation, so that each section was carried to completion up to the load limit for the big yard Gantry cranes, then hoisted in place and buttoned up with electric welding. Deck plating and shell plating is all butt-welded, as well as practically every part of the hull framing, tanks, and stiffening members. Assembly of equipment was arranged on timed







Left: Close up of the Westinghouse electric coupling with part of the case removed.
Above: Main engine control board.
Right: One of the two 325 hp. Washington Diesel auxiliary units on the M.S. "Cape Alava."

delivery schedule. Unlike earlier World War ships, these new C-1-B cargo vessels represent the very last word in freight vessel construction throughout the world.

The following high spots in *Cape Alava* will serve to emphasize the unique departure in construction and equipment followed:

1. Diesel engines are arranged to burn cheap, bunker fuel oil, a radical departure heretofore not thought practical on American ships and tried on but few land Diesel installations. A big shortcut to real operating economy.

2. Almost 100% fireproof construction, with Marinite Asbestos panelling, steel doors, trim and fireproof flooring used throughout. *Cape Alava* is 99.8% fireproof construction.

3. Superlatively planned duplicate power and auxiliary machinery system. Dual Main Diesels, dual Auxiliaries, dual pumping layout, dual hydraulic steering gear, dual radio and navigation equipment, dual heat exchanger system for main and auxiliary lube, fuel and cooling water, dual compressors. In short, a complete, neatly planned duplication of everything mechanical on the entire ship. The only non-dual equipment is the rudder and propeller!!

4. Yacht-like accommodations for officers and crew, located high above the midship sections. Gone is the stinky forecastle and below deck quarters. Thermostatically controlled heating, ventilation and beautiful chromium fittings and three piece porcelain plumbing in quantity. Trim desks, reading lamps, and Beautyrest mattresses everywhere. Plenty of privacy and comfort on this beautiful freighter. The end of dissension among ships' crews, the former curse of all operators, and the electrified galley will keep the cooks happy, too!

5. The whole ship planned in minute detail to actually MAKE MONEY for the operators with a minimum annual repair bill and a minimum of obsolescence through the years.

6. *Cape Alava* has the most complete control system for machinery, fire protection, navigation, cargo handling, ventilating and heating, ever installed on a motorship of its class. The machinery control board is patterned after the latest Diesel Locomotive alarm and control system (remote control duplicate station type), a departure on ships of all classes. A Condenser Service bilge water separator; no more oily bilge pumped overboard; spark arresters; air intake silencers; Korfund Vibro-Isolators; exhaust heat boilers—everything is controlled and waste is eliminated.

Briefly, everything in the engine room is in duplicate, including every pump, motor, Diesel engine and cargo handling accessory machinery (pumps, hoists, etc.); the two 2100 hp. (normal rating) Hamilton Diesels are extremely compact, embodying the latest practices in operating and accessory equipment layout. Each main Diesel has a Roots-Connersville scavenging blower, geared up to approximately 860 rpm., compactly mounted about eight feet above the engine foundation level and driven from crankshaft through gearing and flexible coupling with valves arranged for reversing. The blowers are attached to the outboard part of the engine and form a neat arrangement and simplified piping. Air intakes extend to the stack, drawing air through a pair of 48" x 142" Burgess Snubbers. Each engine has American Bosch fuel injection pumps and fuel admission valves, Woodward Governors, Jones Motrola Tachometers, Manzel Lubricators, and a 16-point Alnor Pyrometer unit on the control board. Two Purolator Duplex fuel oil strainers are provided, one for each engine. The Main Diesels have the following characteristics:

Gross Weight .....440,000 lbs. (2)

Type:

2 cycle, trunk piston 21½" bore, 27½" stroke, 6 cylinder, 233 rpm. B.M.E.P. 59.18 lbs.

Pressures:

Compression—500-560 lbs.
Firing Pressure—725-775 lbs.
Nozzle Opening—5,800 lbs.
Cylinder Safety Valve—950 lbs.
Air Starting Manifold—500 lbs.
Piston cooling—40-50 lbs.
Fuel Oil Header—40-50 lbs.
Scavenging Air—3 lbs.
Exhaust Pressure—0.5 lbs.
Exhaust Temp.—450-550 Deg. F.
Circulating Water Discharger—135-150 Deg.
L. O. Discharge—135 to 150 Deg.
F. O. Temperature—140-160 Deg.
Direct reversing.

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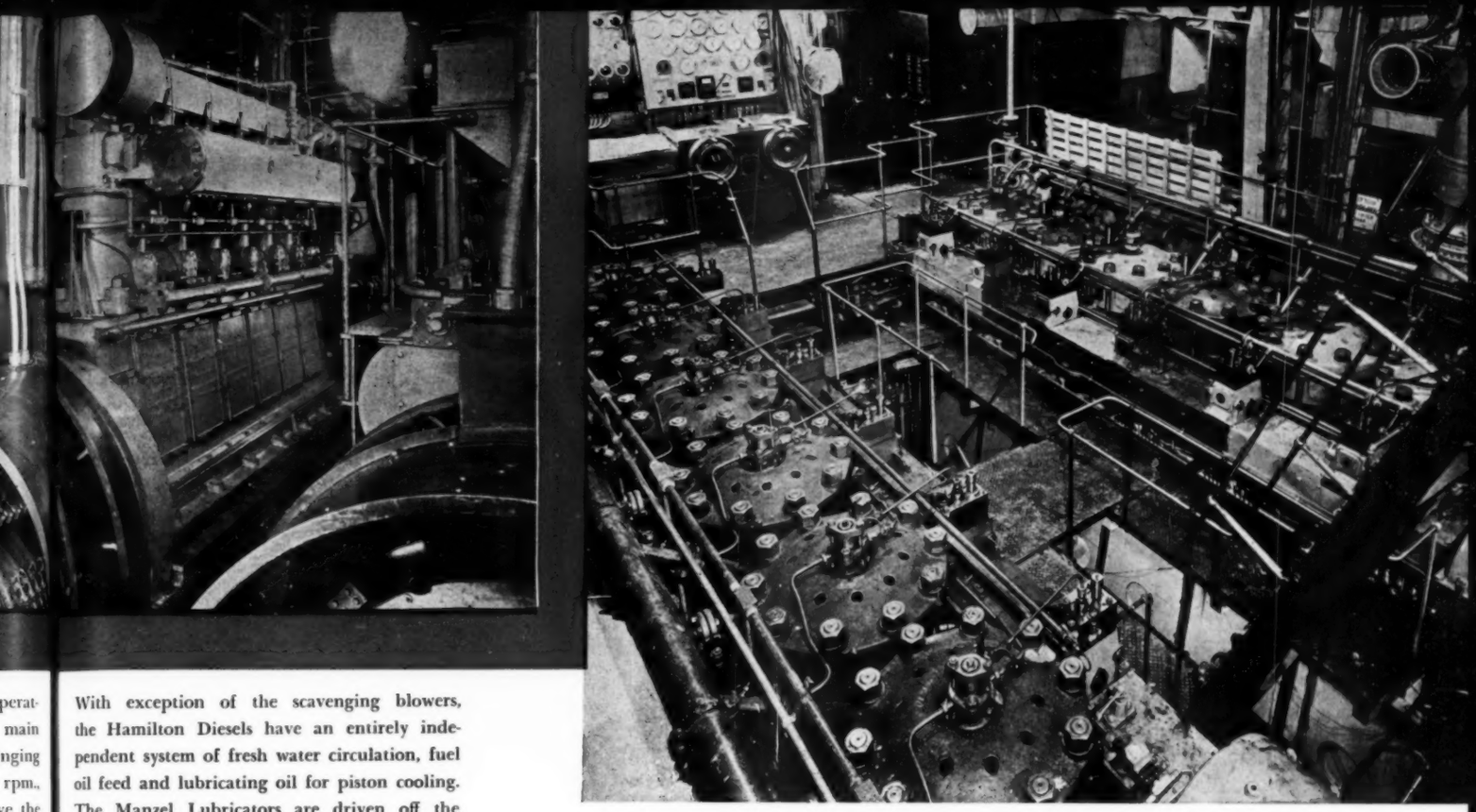


Looking down on the two Hamilton Diesels and looking toward the main control board on the M.S. "Cape Alava."

With exception of the scavenging blowers, the Hamilton Diesels have an entirely independent system of fresh water circulation, fuel oil feed and lubricating oil for piston cooling. The Manzel Lubricators are driven off the main engines. The independent fresh water and salt water pumps are vertical and are all part of the Allis Chalmers—G. E. powered vertical circulating pump system arranged around all four sides of the main propulsion plant on the lower level.

One of the most extensive and neatest uses of the varied line of Ross Heat Exchanger equipment is to be found on the *Cape Alava*. On both the starboard and port sides are tiers of three Ross units, used in duplicate to provide cooling for the piston cooling oil, closed fresh water engine jacket circuit and two spare units that can be used interchangeably. A similar, though smaller duplicate layout of Ross equipment is used to serve the two auxiliary Diesels. A pair of Ross units are used to pre-heat the fuel oil; another set to re-heat the fuel oil after it has been run through Sharples centrifugal purifiers and into the main engine supply line; another small set used to heat the lube oil after running through the Sharples purifiers. All Ross units are very compact, straight tube units, made up of seamless steel, or copper or Admiralty metal, or aluminum brass and offer little resistance to the passage of either steam in the case of heater units or cooling medium in the case of cooler units. Maxim spark arrester silencers are fitted on the main Diesel exhausts which feed into the Foster Wheeler waste heat boiler.

A single control stand, having full control wheels for both Diesels, operating both engines or each independent, dual instrument panel, and a special Pelham Electric Warning Indicator signal board at one side; and control switches for the Electric Couplings, is installed in the engine room.

Each Hamilton Diesel drives a Westinghouse Electro-Magnetic coupling of the self-cooled, squirrel cage induction motor type, 95″ in diameter, transmitting 2080 hp. at 233 rpm. About 90 amps. of current are taken from the auxiliary power circuit to energize the couplings. Each coupling driven member turns against a Westinghouse single reduction double helical gear, 103 inches in diameter, at 2:55 to 1 ratio. An independent lubricating oil system, complete with dual pumps and heat exchangers is fitted to serve the reduction gearing and Kingsbury Thrust Bearing, mounted ahead of the large gear. The assembly thus provides a completely flexible coupling between each Diesel and the main shaft, giving optimum speed rating to both the propeller and main Diesels and eliminating all effects of the Diesels being out of tune when in operation and removing all strain on the driving assembly. The drive shaft is made up of five 23′ 11″ sections of Erie Forge shafting, 14¾″ in diameter, and driving a 17′ 6″ Doran four bladed propeller through a Lignum Vitae bearing at the stern.

In operation, the chief point of interest is the fuel system, which provides for use of heavy black fuel oil, a grade or so better than ordinary boiler oil. Oil is preheated in the double bottom tanks by steam, if necessary, and brought to a settling tank. From there it goes to a Ross heater then to a Sharples purifier, then to the day tank, then through a small Ross heater and to the engines at 160 deg. F.

Piston cooling oil is handled by Quimby gear pumps directly to the pistons, through trombone piping. The centrifuges purify part of the oil as it passes through the circuit continuously. Only fresh, clean, new oil is fed to the cylinders by the Manzel lubricators. Main bearing oil is fed through the piston cooling circuit. The heat exchanger system keeps the fresh cooling water for engine jackets in a close temperature range, and is thermostatically regulated.

The vertical pumping layout, mostly Allis Chalmers, is handily located about the spacious machinery room, to permit easy handling of all fire, bilge, cargo, fuel oil, lube oil, fresh and salt water circuits, and easy inspection and maintenance. Every pump is motor driven, principally with G. E. motors. Elliott oil strainers are placed on the principal suction and discharge circuits, while Quimby fuel, lube oil and cargo oil pumps are used. For the turbine pumps a Nash Wet Vacuum air pump

. . . . . *Now please turn to page 51*

GENESEO, ILLINOIS

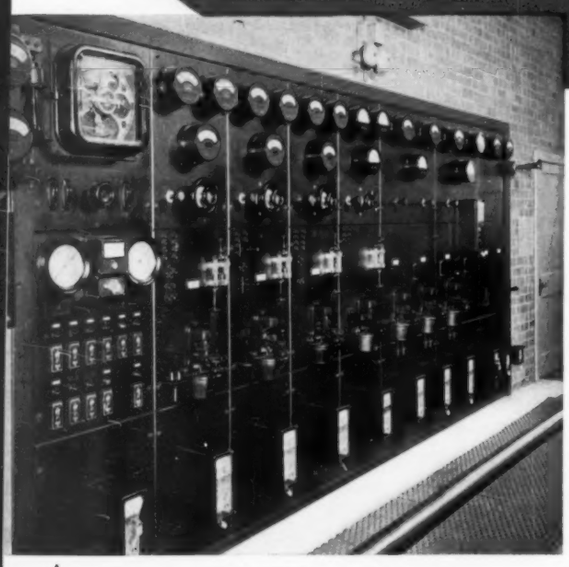
By M. A. CLARK

WHEN the City of Geneseo, Illinois, placed its fourth Diesel engine in operation early in December of 1940, it passed another milepost in the history and development of Geneseo's best asset—its municipal power utility. The installation of this additional engine-generator unit was required to meet the increasing demands for electric service from the municipal system.

The history of this growing municipal plant dates back to the early thirties when Geneseo decided to build and operate its own municipal electric utility. Prior to that time, the city had been served with electricity by the Illinois Northern Utilities Company whose franchise was to expire in 1933. When the city decided to build its own plant and declined to grant a new franchise to the utility company, the utility brought the matter into the courts. In spite of a series of tedious and annoying injunctions, court procedure and litigation, however, the municipal plant was built and began serving the citizens in November, 1933. The utility company has continued to do business in Geneseo since 1933 without a franchise, resulting in the two systems competing for the electric power business in the city. The popularity of the municipal plant, however, is evidenced by the increasing number of customers and the increasing per capita use of electricity. During its first year of operation, the municipal plant acquired only 65% of the electric power business in Geneseo and in the 13 month period from November 1, 1933, to November 30, 1934, sold only 747,616 kilowatt hours. Today the municipal plant supplies over 82% of the electric requirements of the city and sold 2,103,764 kilowatt hours in the twelve months' period ending November 30, 1940.

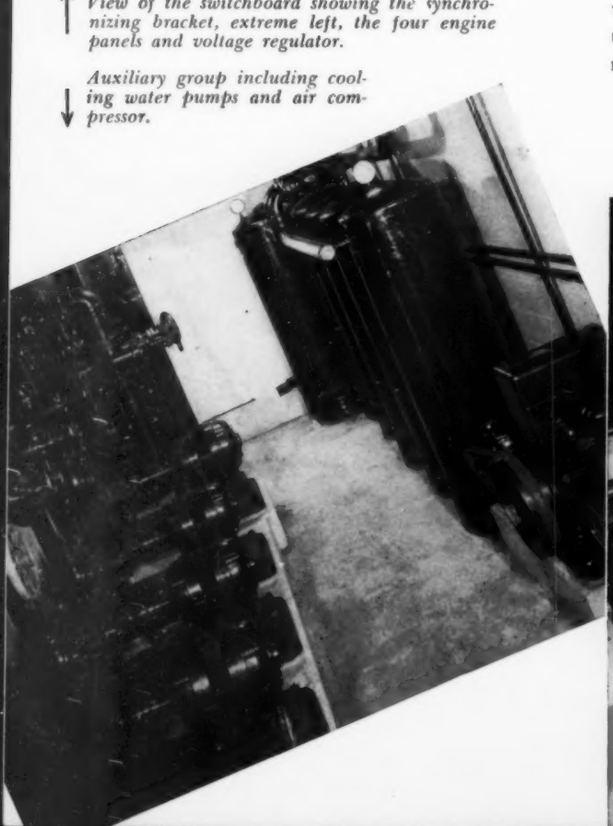
Despite the fact that the municipal plant has been supplying the electric needs of the citizens quite adequately for more than seven years, and that the utility company has no franchise to do business in Geneseo, the utility company refuses to withdraw and the legal proceedings continue. Various attempts were made to prevent the city from constructing its own plant, but in each case the city emerged from court with a decision in its favor. There is now pending an ouster suit started by the city to force the utility company to cease doing business in, and withdraw from, the city of Geneseo. This suit is now pending before the Supreme Court of Illinois.

The original generating equipment which was installed in 1933 consisted of three Fairbanks-Morse Diesel engine-generator units as follows:

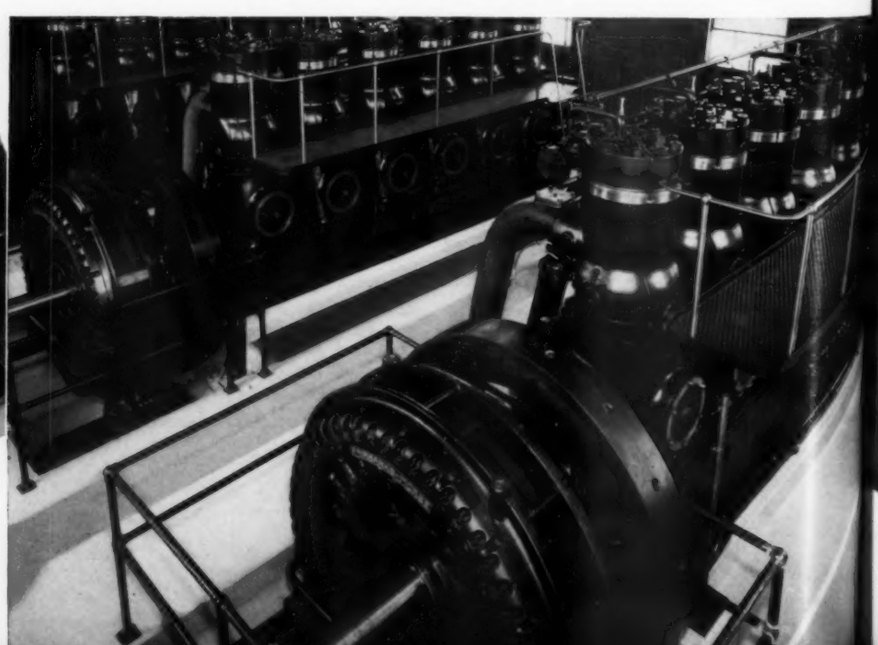


View of the switchboard showing the synchronizing bracket, extreme left, the four engine panels and voltage regulator.

Auxiliary group including cooling water pumps and air compressor.



Engine room view with the new 450 hp. F-M Diesel in the foreground.



One 4 cylinder, 14" x 17", two-cycle Diesel engine direct-connected to a 184 kw., 3 phase, 60 cycle, 2400 volt Fairbanks-Morse alternator with a 10 kw. direct-connected exciter, and two 6 cylinder, 14" x 17", two-cycle Diesel engines, each direct-connected to a 283 kw., 3 phase, 60 cycle, 2400 volt Fairbanks-Morse alternator and a 10 kw. direct-connected exciter.

These three units have been able to handle the load up until recently, but the loads have been increasing each year to such a point that it has required *all three* engines to handle the peak loads encountered during the past two years. The fact that there have been no service interruptions without stand-by power at peak loads is a tribute to the reliability of the engines and the skill of the operating personnel. During the past seven years when the total installed capacity of the plant totalled only 750 kilowatts, the total power generated has increased from 853,000 kwh. to 2,335,500 kwh.

To supply the growing demands for power from the municipal plant, Geneseo has recently installed its fourth Diesel engine-generator unit which consists of a six-cylinder, 14" x 17", 300 rpm., 450 hp. Fairbanks-Morse two-cycle Diesel engine direct-connected to a 300 kw. Fairbanks-Morse alternator and a 10 kw. direct-connected exciter. The new engine is identical in many details with the former engines installed in 1933; however, improvements in the scavenging system of the newer model engines have resulted in a greater reserve power which has been accompanied by a decrease in fuel consumption per kilowatt hour.

The air intake system for each engine is identical and consists of a 16" diameter sheet-iron duct bringing in the air from the outside of the building and up through the concrete engine foundation to the point where it enters each engine crankcase. The engine exhaust system consists of individual exhaust pipes from each cylinder which carry the exhaust gases downward to underground exhaust ducts which extend from alongside each engine to the outside of the building. At this point, the exhaust [illegible] up along the outside wall of the building to Maxim exhaust silencers. The original engines were equipped with type [illegible] silencers, while the new unit is equipped with a type MPC silencer. Each cylinder exhaust [illegible] with a thermocouple which is connected to an [illegible] for indicating the temperature of the exhaust gases.

The engines are cooled with an [illegible] cooling water system in which all of the [illegible] is treated in a "Master Line" Zeolite type of softener. A supply of several thousand gallons of treated water is stored in an underground concrete well and is added to the system as needed to overcome losses from windage and evaporation. The water treating equipment used in the plant is a product of the Automatic Pump and Softener Company. The cooling water is circulated by any one or more of five pumps which are connected to the main cooling water line supplying all engines. There are four two-inch Fairbanks-Morse pumps each direct-connected to a 5 hp., 1760 rpm. Fairbanks-Morse electric motor. The fifth pump is of the same type as the first four but is of four-inch size and is driven by a 7½ hp. motor. After leaving the engines, the water flows to an atmospheric type cooling tower which is located on the spacious grounds behind the plant building.

There are thermometers on the cooling water discharge of each cylinder and on the inlet cooling water headers to each engine. Water is supplied to the engine at a temperature of 100° F. or slightly higher, and this condition is controlled by regulating the quantity of cooling water passing over the tower. The circulation of water is supplied to the jackets whether the engines are running or not. Thus the engines are warm at all times which results in easy starting, freedom of moisture in the crankcases, and allows the cylinders to act as heating surface for the engine room. The air starting equipment consists of a two-stage, [illegible] x 3⅜ water jacketed Fairbanks-Morse air compressor V-belt driven by a three hp. Fairbanks-Morse 1760 rpm. induction motor. Provision has been made for the compressor to be driven also by a four hp. gasoline engine.

The switchboard, consisting of one control panel, four engine panels, three distribution panels, and a swing bracket for the synchronizing equipment was supplied by the Marquette Electric Company. An Allis-Chalmers Rocking Arc Constant Voltage regulator of the Brown-Boveri type controls the voltage output of the three older units, while the new unit is regulated by a General Electric "Diactor" type of regulator. Each engine and distribution panel is equipped with Weston ammeters, voltmeters and wattmeters, and General Electric kilowatt hour meters.

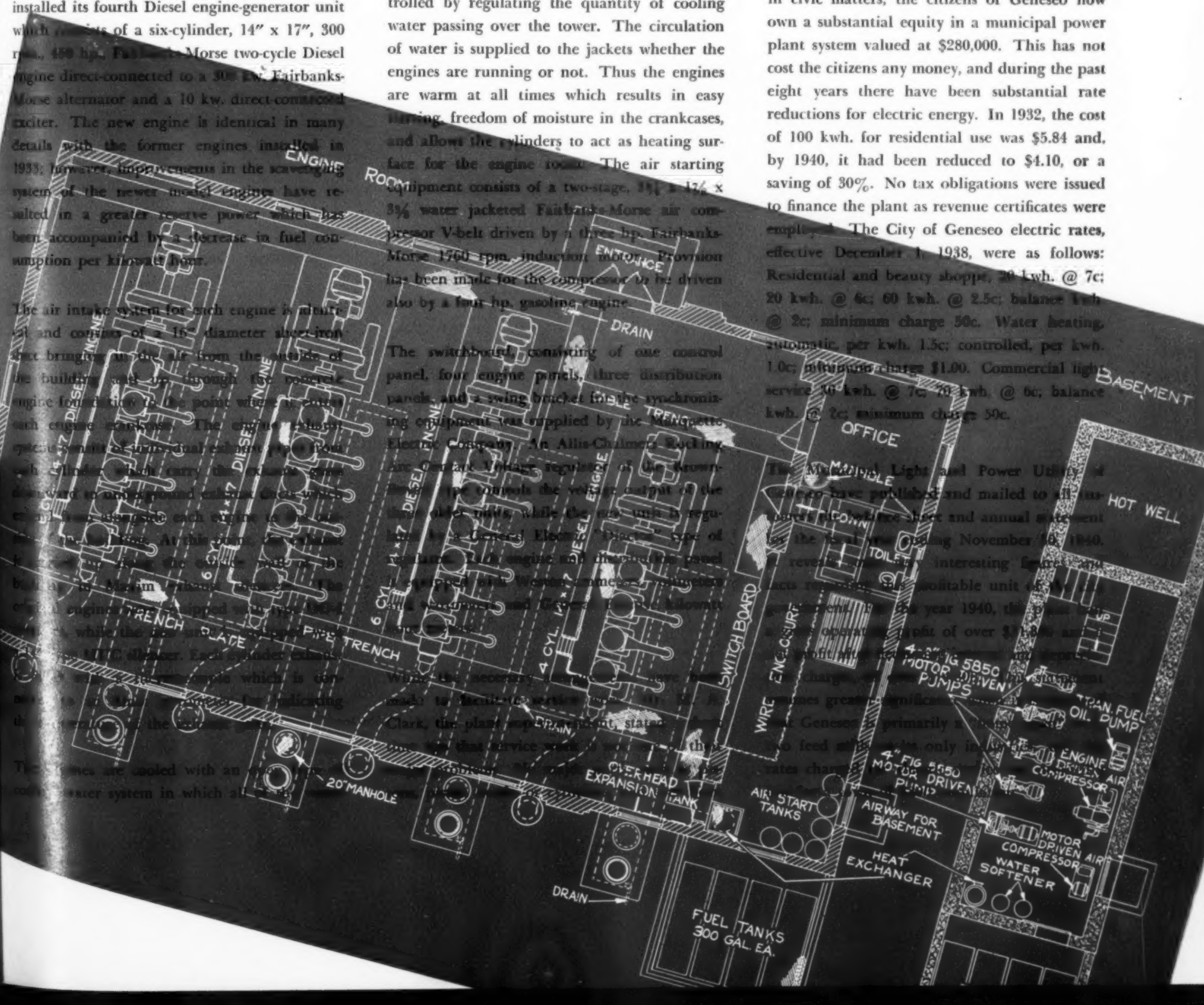
While the necessary [illegible] have been made to facilitate service [illegible], Mr. M. A. Clark, the plant superintendent, stated [illegible] that service [illegible] replaced on these engines. This record was still intact when the writer visited the plant in January and the engines had the following total operating hours to their credit:

Engine	Size	Installed	Total Operation
No. 1	280 hp.	Oct., 1933	31,164 hours
No. 2	420 hp.	"	20,609 "
No. 3	420 hp.	"	20,853 "
No. 4	450 hp.	Dec., 1940	150 "

When the municipal plant began serving Geneseo in 1933, there were only ten electric ranges in the town. Today there are over 300 electric ranges in Geneseo, the increase indicating another trend in better living due to cheap electricity. The municipal plant is gaining good will in the surrounding territory by supplying current at a very low rate to over 150 miles of rural electric lines serving more than 300 families.

As a result of their far-sightedness and loyalty in civic matters, the citizens of Geneseo now own a substantial equity in a municipal power plant system valued at $280,000. This has not cost the citizens any money, and during the past eight years there have been substantial rate reductions for electric energy. In 1932, the cost of 100 kwh. for residential use was $5.84 and, by 1940, it had been reduced to $4.10, or a saving of 30%. No tax obligations were issued to finance the plant as revenue certificates were employed. The City of Geneseo electric rates, effective December 1, 1938, were as follows: Residential and beauty shoppe, 20 kwh. @ 7c; 20 kwh. @ 6c; 60 kwh. @ 2.5c; balance kwh @ 2c; minimum charge 50c. Water heating, automatic, per kwh. 1.5c; controlled, per kwh. 1.0c; minimum charge $1.00. Commercial light service 20 kwh. @ 7c; 20 kwh. @ 6c; balance kwh. @ 2c; minimum charge 50c.

The Municipal Light and Power Utility of Geneseo have published and mailed to all customers the balance sheet and annual statement for the fiscal year ending November 30, 1940. It reveals some very interesting figures and facts regarding this profitable unit of the city government. For the year 1940, the plant had a net operating profit of over [illegible] and a profit after [illegible] and depreciation charges [illegible]. This statement assumes greater significance [illegible] that Geneseo is primarily a [illegible] two feed [illegible] only [illegible] rates charged [illegible]



DIESEL IRRIGATION

By WILL H. FULLERTON

WATER, for years, has been the outstanding farm problem of the Southwest. Prominent among the districts, whose development has been held back only by lack of water, is that around Duncan, Arizona. Duncan is situated in the southeast part of Arizona and lies just a few miles from the western boundary of New Mexico. Here there is a rich farm area (with water) covering some 4800 acres in a long strip about three miles wide and twenty-one miles long. The area supports some 250 to 300 farms and about 5000 people.

Irrigation has always been accepted as essential to any farming in this vicinity. But, only in two seasons out of the last forty-one years has there been enough water to irrigate throughout the summer. The months of June and July, when most crops mature, have always been dry . . . the very time when abundant water is most needed. What natural water is available comes from the Gila River. This river has its source in New Mexico, runs south some fifty miles, then turns into Arizona.

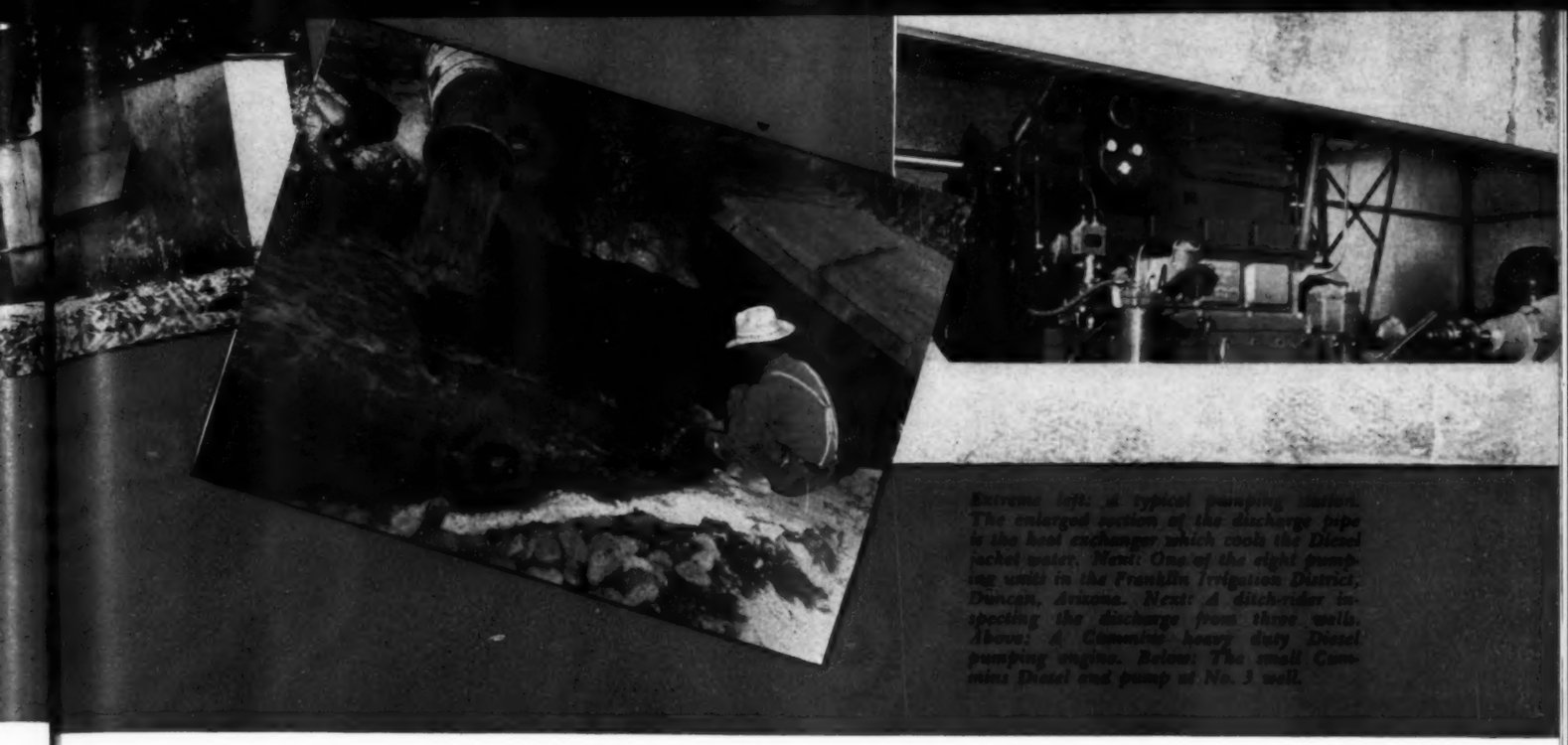
Years ago, canals, which look like nothing more than road side ditches, were cut out from the Gila River. The main canals in the Duncan area are five in number and three of them, the Valley, Sunset and Moddle Canals, have their heads in New Mexico. Duncan's water rights on the Sunset canal go back to 1877; the town ditch or the Duncan canal goes back to about 1888, and the Moddle Canal dates from about 1893. The Duncan canal is the smallest one and supplies water for 500 acres.

As can be imagined, the controversies over water rights and supply were many and bitter. They became more intense as water in the Gila River annually diminished and men watched each year's labor shrivel under the merciless sun. Each year the amount of water dropped off and conditions became more desperate.

Deciding that it was time for definite action, the men in the district banded together. In 1935, they formed a committee, called it the Franklin Irrigation District and set up Roy D. Williams as President, Joseph D. Wilkins as Secretary, and Edward Lunt and Ralph E. Elledge as members. In this same year, application for a WPA loan was made to the government for $80,000, 45% of which was to be a grant. The remaining 55% was to be paid back over a period of 25 years at 4% interest. This money was to finance the installation of wells to supplement the water flow in the various distribution canals.

Originally, the plan called for electric power. This plan, however, had several serious drawbacks. Aside from installation expenses, which would have been very high, the assurance of sufficient current even became a question. There was a decreasing supply of water behind the Coolidge Dam where the current would have to be generated. Hence, a final decision to use Diesels was made and bids were invited. The eight engines selected were four different models of Cummins Diesels. These full Diesels are instantly started on Diesel fuel by standard electric starting motors with the exception of one heavy duty model which is air started.

Each well is a model pumping installation from its correctly designed concrete foundation to its sheet iron house. All of the installations are similar in appearance. They differ only in the particular size of engine and pump used with resultant variations in installation detail such as concrete base specifications, capacities of fuel tanks, heat exchangers, expansion tanks and the sizes of discharge pipes.



Extreme left: A typical pumping station. The enlarged section of the discharge pipe is the heat exchanger which cools the Diesel jacket water. Next: One of the eight pumping units in the Franklin Irrigation District, Duncan, Arizona. Next: A ditchrider inspecting the discharge from three wells. Above: A Cummins heavy duty Diesel pumping engine. Below: The small Cummins Diesel end pump at No. 3 well.

Tests were started on the first five engines on July 13. At this time water was needed so badly they were operated continuously for a period of twenty days. After this, water was again available from the river and the pumps were shut down. The other three engines and pumps, unlike the above five, each contribute to a common pipe line to the Moddle Canal.

The wells are numbered, one to eight. Number Two well is the deepest, going down 90 feet. The others range down to a minimum of 48 feet. Wells number 5, 6 and 8, the three on the pipe line, throw a total of 13 second-feet of water. Final cost of the project was $74,600.

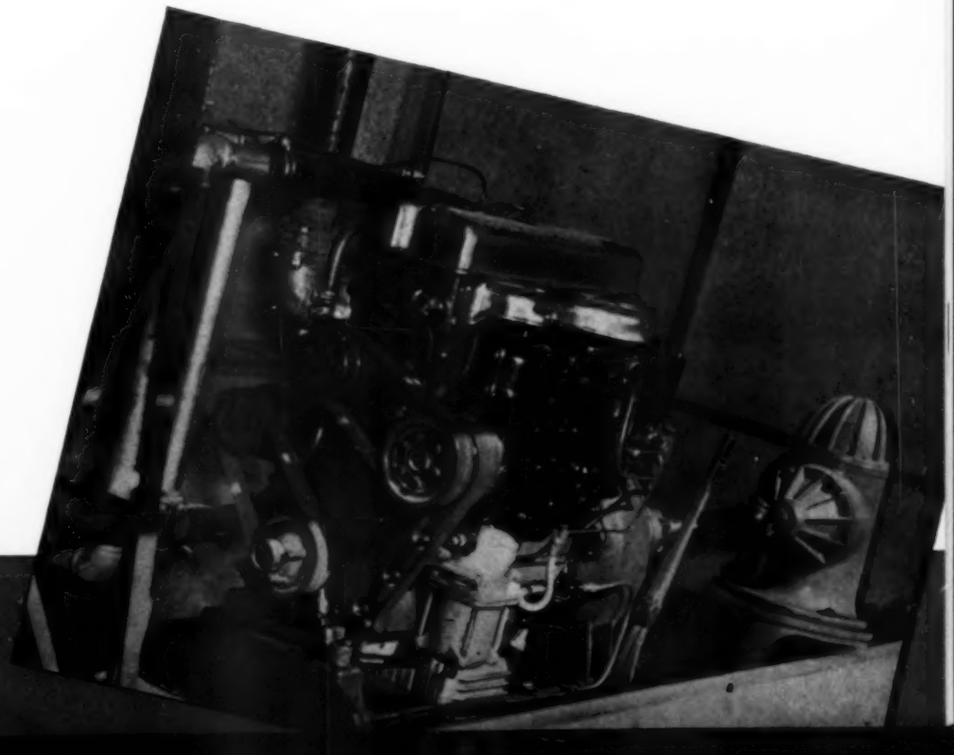
All of the pumps are Johnston Turbines equipped with Johnson gear heads. Each is direct driven through Watson-Spicer "universal joint type" couplings. All of the pumps operate 1760 rpm., except number 7 which is powered with the heavy duty Diesel. It turns 1160 rpm. The total heads of the different wells vary from a minimum of 32 feet to a maximum of 100 feet. Gallonage required from each well ranges from 1350 gpm. to 2925 gpm. The flow of the wells has been increasing with use and they are now producing substantially more than the specified minimum. Originally, the eight wells were to produce a specified total of 54 second-feet of water. When the wells were shut down at the end of the 1940 season, they were producing 60 second-feet.

The cooling system used for these units is one which is highly efficient and not frequently seen. Engine cooling water is circulated through the expansion tank and then piped outside the building back to the pump discharge line. Set in as part of the discharge line is a heat exchanger with a construction similar to that of a steam boiler; i.e., many pipes honeycombed through a tank. This unit permits the full, unretarded passage of discharged water and, at the same time, provides efficient cooling for the engine water circulating around the pipes. Circulation of the water is handled by the standard built-in engine jacket water circulating pumps.

Just what these wells mean to the 5000-odd people of Duncan was put into words by one of the "ditch riders" or, properly, the water master, whose job is to maintain the ditches. He said, "These wells are a life-saver. Now, we can grow anything the climate will permit. Even now, we have 300 acres planted in lettuce. This spring we plan to have 500 acres of lettuce and another 300 in onions. This produce is much more valuable than the little grain and cotton which was all we could grow before. With our own wells we can throw all the water we need, when we need it. Using these Diesels, we have figured that fuel and lubricating oil costs us $1 per acre-foot of water."

Previous cost of water from the river was $3 per acre foot. Total costs for the new Diesel units for operation, investment, maintenance, etc., will run a little higher than $3 per acre-foot but will be more than offset by making possible the production of more valuable and much larger crops.

It is expected that the pumps will be needed only some four months out of the year, or during June, July, August and September. Operation during this time is likely to be twenty-four hours per day for the most part.



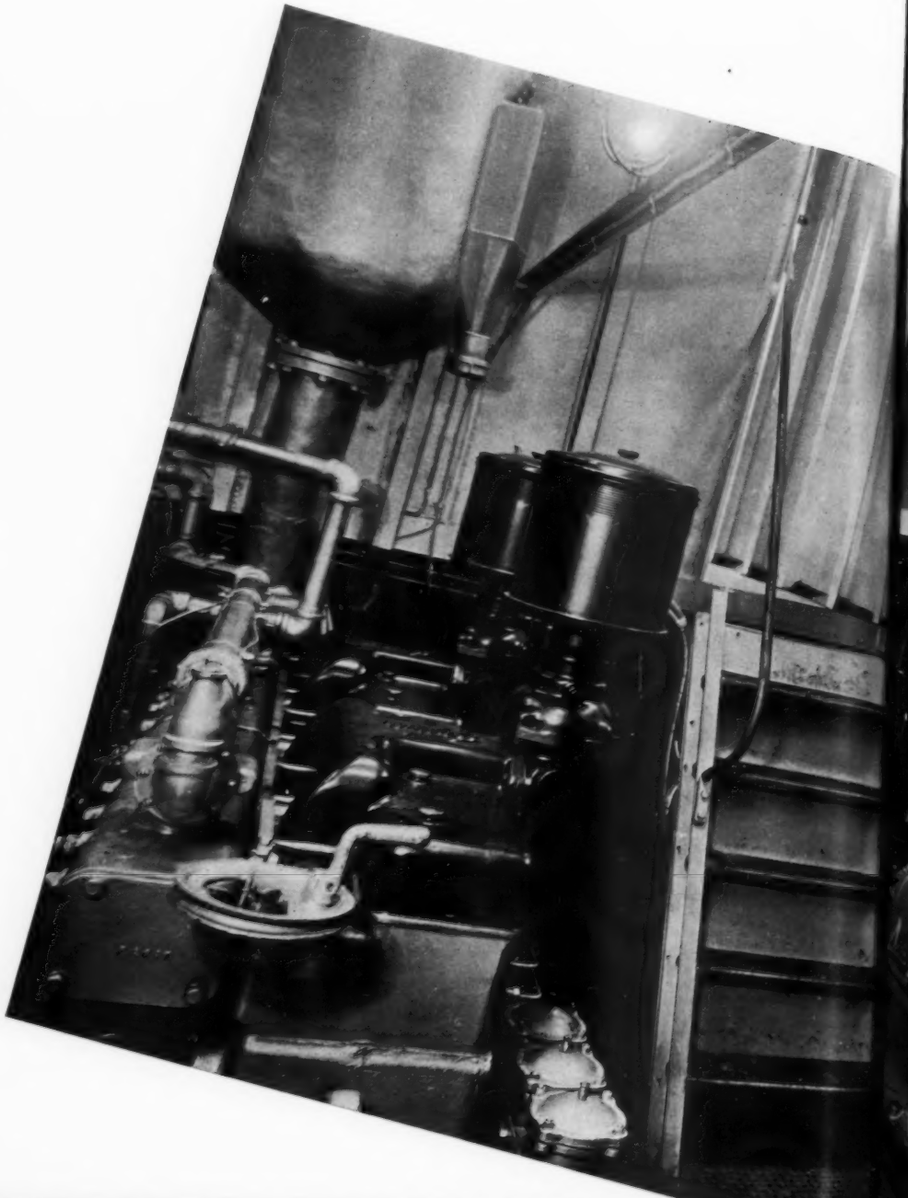
DISTRIBUTION BOX BOATS

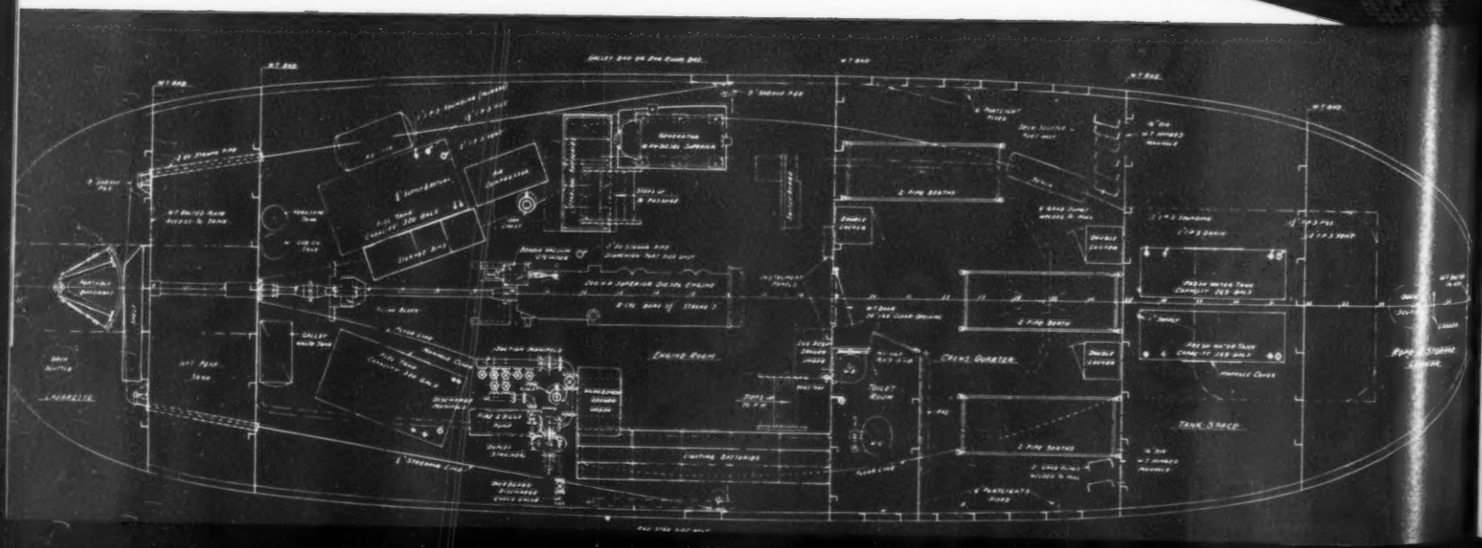
By WILL H. FULLERTON

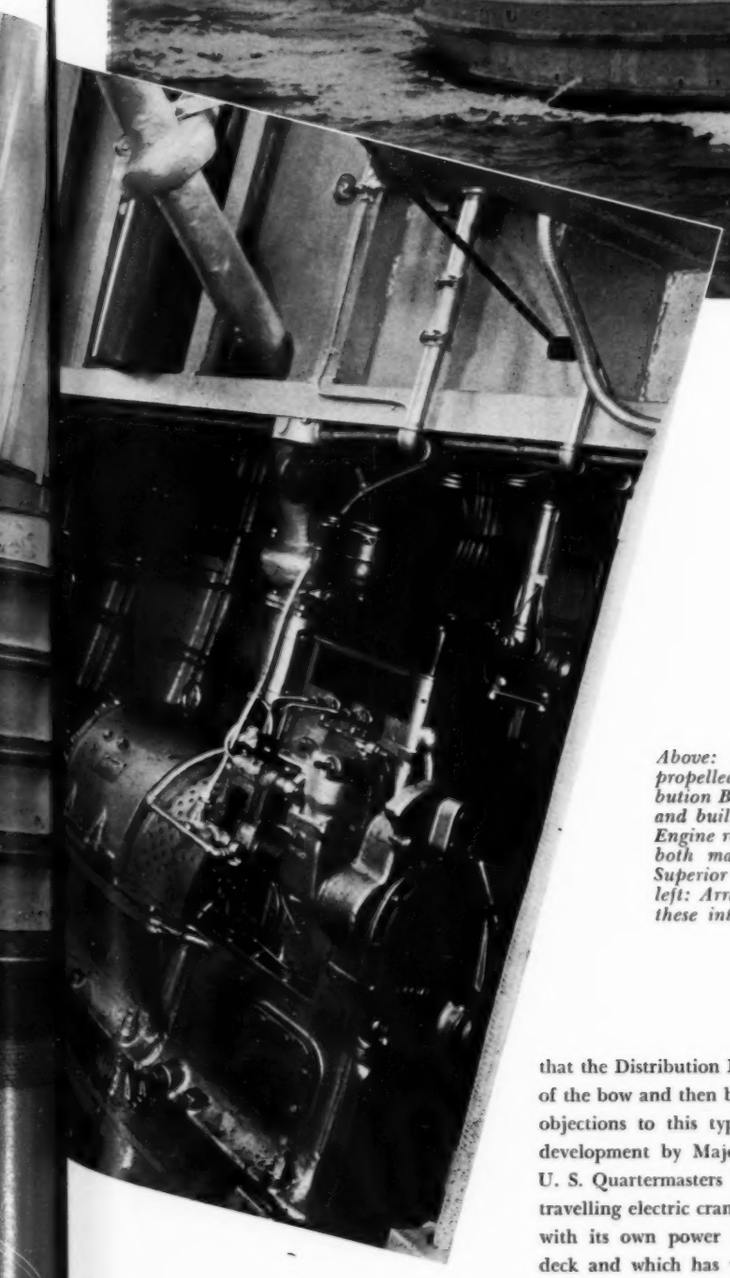
FOR many years the Coast Artillery has been using wooden Distribution Box Boats in connection with mine laying activities off the coastal waters of the United States. The operation of these boats is particularly arduous. The boats accompany the mine planters, mine tenders, and other vessels to the mine fields, which, due to the long range of enemy guns, are now often located many miles off the shore. The mines are laid by the planter and being of controllable type, the control cables are laid to the mines to a junction box where they are all connected to a central point from which, in turn, is laid the multiple wired cable that goes to the shore, and through which the individual mines can be detonated when an enemy is in their vicinity, exploding them electrically. The mines may be made innoxious to allow a friendly fleet to pass over, and again they may be so charged that they are contact mines which would bar the passage of an enemy fleet.

The work of the Distribution Box Boats is to lift these mines with their derrick from the sea bottom, deposit them on deck, and allow electricians of the artillery corps to make the necessary connections. Usually these Distribution Box Boats are anchored with four anchors, two diagonally from the bow and two diagonally from the stern, using heavy anchors which are laid by larger ships. Here the Distribution Box boat must operate until its job is finished, in spite of any weather conditions that may arise and the Distribution Box again dropped into the sea.

The older wooden boats that have been used for this purpose had a mast and fixed horizontal boom on which there was a carrier, so







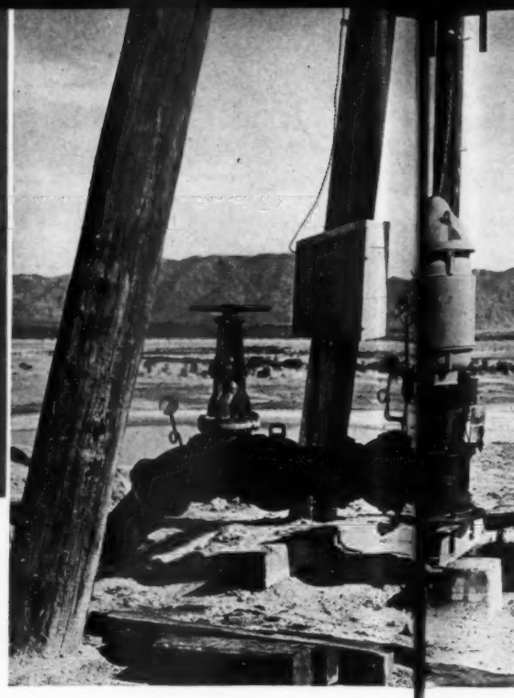
Above: The 65', Diesel-propelled, all steel Distribution Box Boat developed and built by Luders. Left: Engine room view showing both main and auxiliary Superior Diesels. Lower left: Arrangement plan of these interesting craft.

that the Distribution Box could be lifted ahead of the bow and then brought in on deck. Many objections to this type of gear resulted in a development by Major W. W. Moore of the U. S. Quartermasters Department of a unique travelling electric crane or derrick which moves with its own power forward and aft on the deck and which has worked out most successfully. To accommodate this new type of derrick and give additional deck space and general improvement of seaworthiness and ruggedness and speed, the Quartermasters Department gave a contract to the Luders Marine Construction Company to design and develop and build four such boats to specifications and controlling information from that Department. The result is shown in the plans and photographs of the interesting craft which was developed of the following dimensions: length overall, 65 ft.; length waterline, about 60 ft.; beam, 18 ft.; draft, 6 ft.; displacement, about 150,000 lbs.; hp., 200; speed, 12 miles max. The vessels are equipped with a 6 cylinder Superior Diesel Marine main engine of 5½" x 7" and a Superior Diesel auxiliary generating engine as built by the National Supply Co. A 3 to 1 reduction gear gives a propeller speed of about 450 revolutions. The engine starting equipment and the 110 volt lighting batteries are Exide Ironclad. The fire and bilge pump, supplied by Ingersoll Rand, in addition to pumping out the bilges, is so connected that fresh water which is carried in the peak tanks may be transferred from one tank to the other to counter-balance any excessive trim that may be set up when lifting Distribution Boxes that become entangled with obstructions on the ocean bottom.

As a check on the lines and the speed which were developed by the Luders Marine Construction Company, a 10 ft. model was built and tested at the Model Basin in Washington. The results correspond practically exactly with anticipated results and with actual trial attainments. The boats have already proved most satisfactory in service for the purpose. They are most stable, seaworthy and handy.

DIESELS FOR SALT RECOVERY

By GEORGE D. GROSSLEY



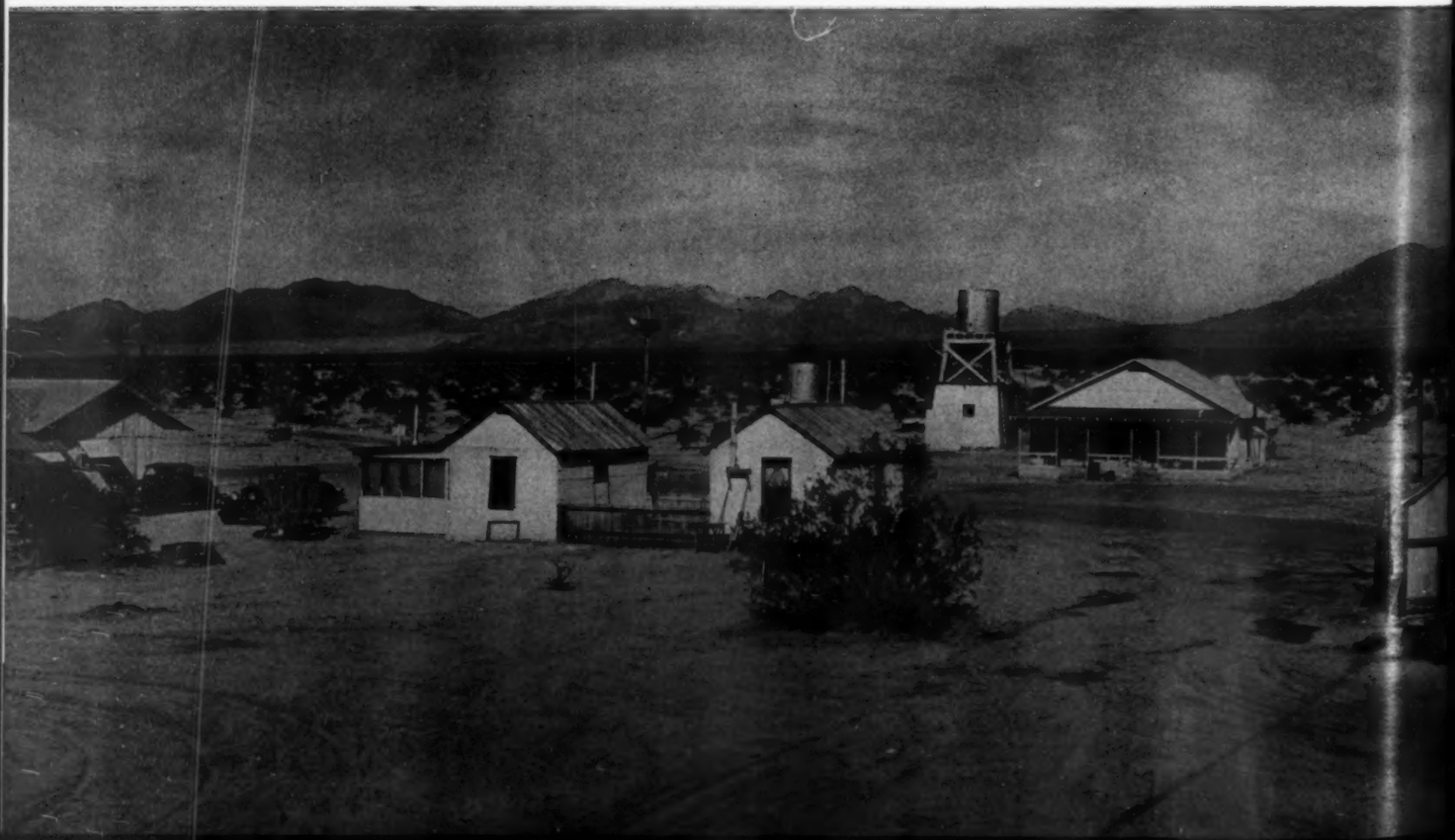
One of the electrically-driven deep-well brine pumps.

TWO shining new Diesel generating plants are helping make history in the Dale Lake desert region of Southern California, by supplying power to a sodium sulphate recovery operation which is using a unique and new method of salt recovery. In no other salt mining plant has it been possible to make nature do as much of the work, and the operators of the Desert Chemical Company give the credit to the unusual climatic conditions of the desert, plus the unique combination of pure salt deposits deep in the earth.

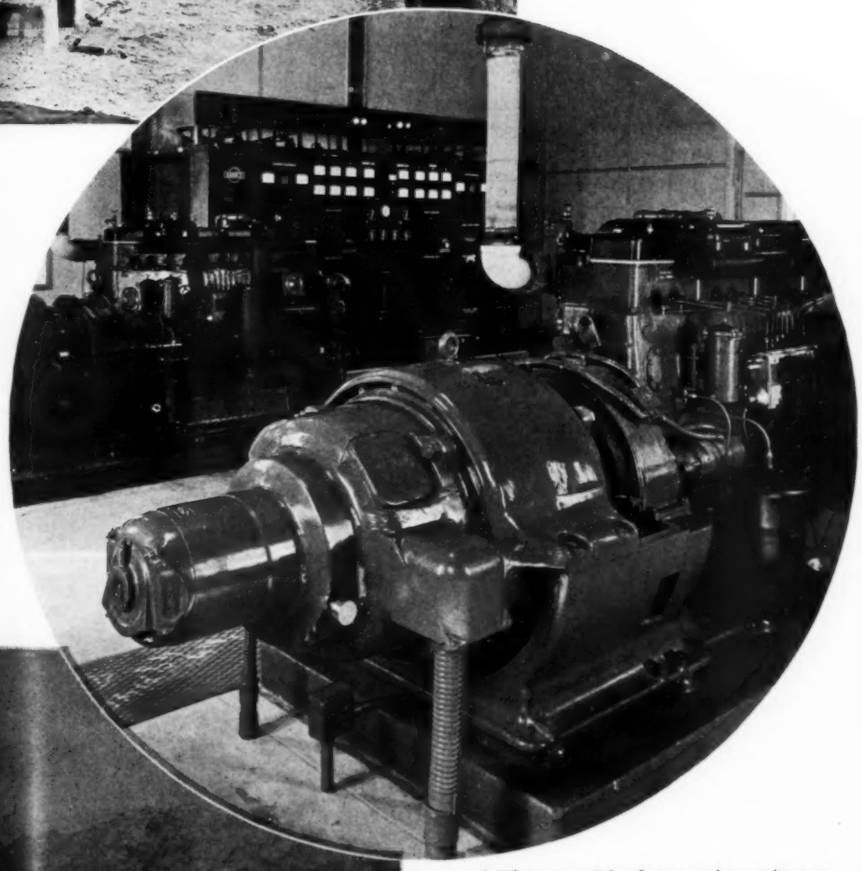
Ordinarily, elaborate evaporating and condensing systems are necessary to extract sodium sulphate—which is more commonly known as salt cake—but beneath the properties of the Desert Chemical Company there is a subterranean lake to a central distributing station. When temperatures are below 60° F., the Glauber's salts are precipitated from the brine and later dehydrated by solar evaporation. The residual brine is then pumped into a 100 acre evaporation pond. Through the heat of the summer the brine in the pond evaporates and leaves an almost perfectly pure deposit of sodium chloride. Thus both the chill of the winter and the heat of the summer are utilized to obtain the two types of salt, and it is expected that the first season will produce 50,000 tons of sodium sulphate.

Construction on the entire plant, which occupies over 500 acres, and which may shortly be expanded to embrace the 1500 acres held by the company, was started in March of 1940. Two Caterpillar Diesel tractors moved thousands of yards of adobe earth to form the dikes of the 100 acre evaporation pond, and thousands more yards were moved during construction of the four settling tanks. Twelve miles of road were built, six miles of high tension power line erected, in addition to the building of a dozen houses, sheds, repair shops and the power plant building. While there are but three brine wells at this time, additional wells will be equipped with 40 hp. pumps in the immediate future which will also require additional power plant facilities.

From the foregoing outline of the production process it will be observed that electric power is very much a part of the process, for without it the subterranean brine lake would remain



The power house and cooling tower of the Desert Chemical Company, Dale Lake, Southern California.



These two Diesel generating units supply power for production of 50,000 tons of salt cake annually.

The Desert Chemical Village at Dale Lake, Southern California.

where it has been for past centuries, and without cheap electric power the "village" built for the employees of the Desert Chemical Co. would be without light, heat, air-conditioning equipment and the other comforts and conveniences of urban life.

Electrical energy for this isolated operation is supplied by two Bardco Diesel generating units, each unit consisting of a Superior eight cylinder Diesel engine direct connected to a Master 94 kw. alternator. The entire electrical equipment including switchboard, voltage regulator, synchronizers, safety controls, and alarm system were manufactured by Bardco.

Current is generated at 2300 volts and step-down transformers are installed at the three wells, the central booster station, and at the distribution system for the village. Each of the 40 hp. deep-well turbine pumps delivers 900 gallons per minute into 18 inch concrete pipes. These lines are gathered at the central booster station, where one 40 hp. and one 15 hp. pump send the brine to the settling tanks through 24 inch lines, where 8 inch headers distribute the brine through spray nozzles placed at 25 foot intervals along the headers. All piping is concrete with special composition liners which resist the corrosive action of salt brine.

A small 6.6 kw. Bardco emergency or stand-by generating plant is installed in a small power house at the village for use when the larger generating units are shut down. This 6.6 kw. unit was used during the construction of the facilities at Dale Lake to provide light and power for small wood-working tools, and other light machinery, as well as illumination of the construction camps.

The normal operating schedule during the winter and spring calls for twenty-four hour per day service from both units, although during the summer the load is lighter and one unit can handle it providing the present number of wells is not increased. Fuel oil is stored in a 10,000 gallon tank, and is passed through Purolator filters before injection. Vortex air intake filters are installed on each engine because of dust storms which frequently occur in that area of the desert. A bank of 24 volt Willard storage batteries is used for starting the Diesels. A cooling tower is adjacent to the plant. Maxim silencers so efficiently quiet the exhausts of the two large Bardco generating plants that at 150 feet the exhaust is inaudible.

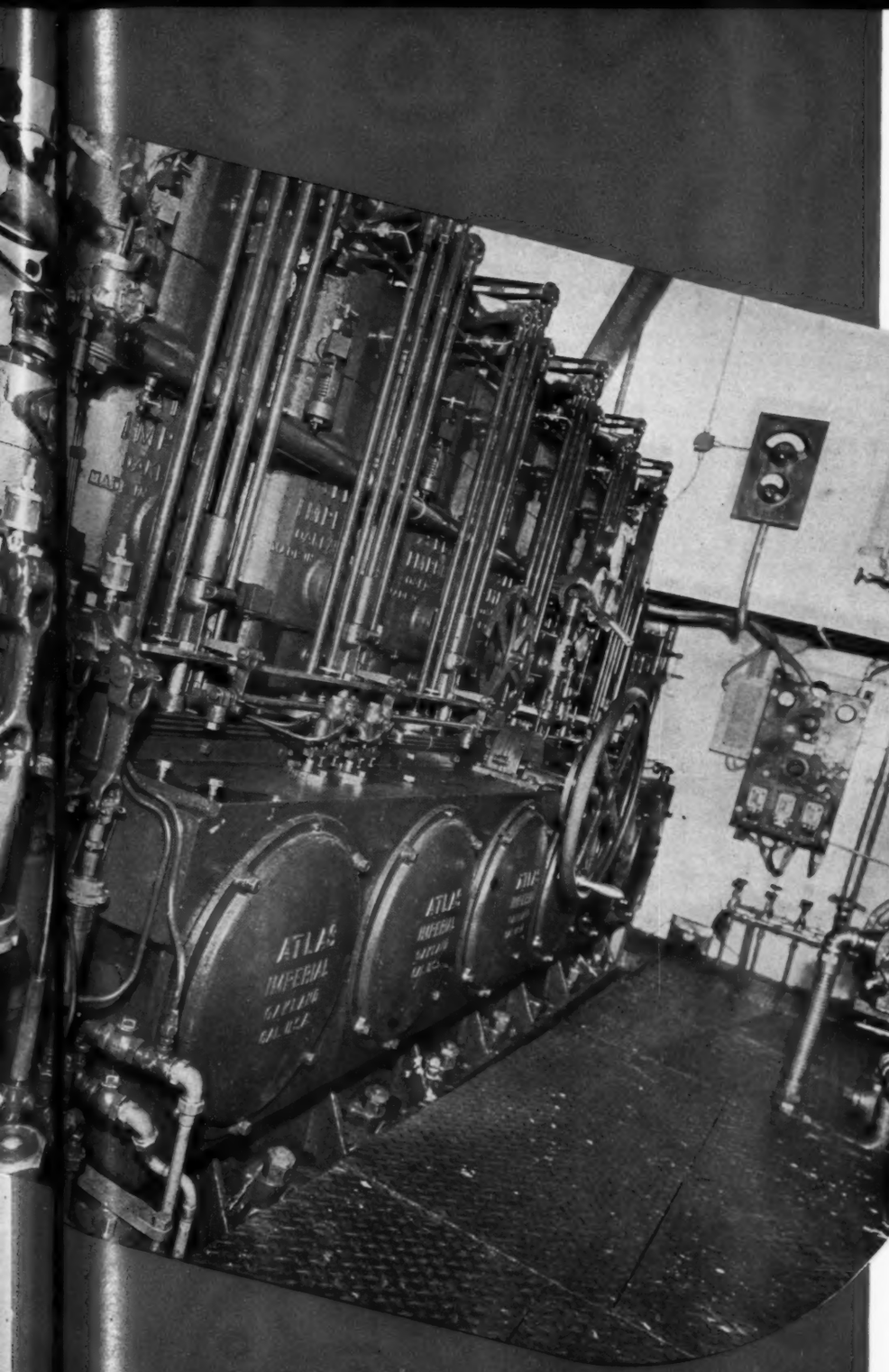
By DWIGHT ROBISON

CAPTAIN J. H. Coppedge signed up before the mast at the age of eleven and rose from a green hand on a sailing ship to become Master for C. D. Mallory on Hog Island ships for six years after the World War. With this practical background, plus his later experience as a tugboat owner and operator since retiring from active sea service, the Captain's selection of a new tug is of unusual interest. Further, his new boat is the forty-fifth to come off the ways of F. B. Walker & Sons, Pascagoula, Mississippi and typifies modern welded hull construction as fabricated by one of America's best known tugboat builders.

The *J. H. Coppedge* is now the largest and most powerful of the Coppedge fleet and was ordered to handle heavier barges that the owner has recently placed in service. She is approximately seventy feet long and is driven by a slow-speed, heavy-duty, 6 cylinder Atlas-Imperial Diesel rated at 300 hp. at 300 rpm., turning a three bladed, 70″ x 34″ Columbian Bronze propeller. This type "wheel" is almost universally favored for the relatively shallow draft service in the vast network of canals, rivers and bayous forming water communications between Gulf and river ports.

Although the new tug was built at the Walker yard she was ordered from Arthur Duvic's Sons of New Orleans, a firm of ship chandlers established in 1894 with ample practical experience in outfitting, designing and operating Diesel tugs. Thus, this vessel combines the knowledge of owner, builder and broker to represent the last word in towing excellence at unusually low cost and with minimum anticipated maintenance. The general hull form approximates the thoroughly proven and well-known Dialogue lines first produced in Camden, N. J., some years ago. It is virtually impossible for this boat to "freeze" against the side of a tow regardless of how restricted maneuvering conditions may be in a narrow channel. In addition to the positive action of the large propeller, maneuvering is further improved by a streamlined rudder with modified air foil section, which is the owner's personal design. Crew quarters are above the weather deck for maximum personnel comfort in a hot climate, and all construction above the deck house is of wood for the same reason.

Auxiliary equipment reflects efficient yet economical design. Electric current while under way is supplied by a Westinghouse generator V-belt driven from the main shaft and in port or standing by from a single cylinder Atlas generator set, which also combines a Quincy



The new 300 hp. Atlas-Imperial Diesel tug recently delivered to Capt. J. H. Coppedge at the F. B. Walker & Sons shipyard.

Starboard side of the "J. H. Coppedge" engine room showing the control station of the 300 hp. Atlas-Imperial Diesel. The Weston electric tachometer and Alnor pyrometer appear in the background on the forward engine room bulkhead.

J. H. COPPEDGE

A Salty Name Goes Back to Sea

starting air compressor and general service pump. Exide marine type batteries float on the line to maintain constant electric power under all conditions. The main Atlas Diesel is fitted with a Weston electric tachometer, Alnor exhaust temperature pyrometer, a Maxim spark arrester-silencer connected to the exhaust manifold by Penflex flexible metal hose, and the customary engine-mounted pumps and filters. A Goodrich rubber stern bearing affords protection against sand and mud during extremely shallow water service. The tug will carry a crew of seven and has a wide cruising range without putting in for fuel or supplies.

MACARONI PLANT DIESELIZED

By MONTE HARRIS

HAVING grown from a small venture, producing a few hundred pounds of macaroni a week back in 1915 to a capacity of 75,000 pounds of various macaroni products a week at present, the Refined Macaroni Company of Brooklyn, New York, was recently faced with the problem of meeting competitive prices without lowering its standard of quality. As the story unfolds, it is interesting to see how easily this problem was solved by the installation of a Diesel engine.

It resolved into the old search for the elusive variable cost item in the business. Rent was fixed, heating expense was fixed, materials prices fluctuated—mostly upward, payroll certainly could not be reduced, and there remained the power bill, 17,000 kwh., costing $435 every month. Here was an item that would bear investigation and Messrs. P. Zuaro, G. Zirpolo and N. Barbaria, owners, hit on the idea of installing their own power plant, a new idea to them but typical of what is happening more and more frequently today.

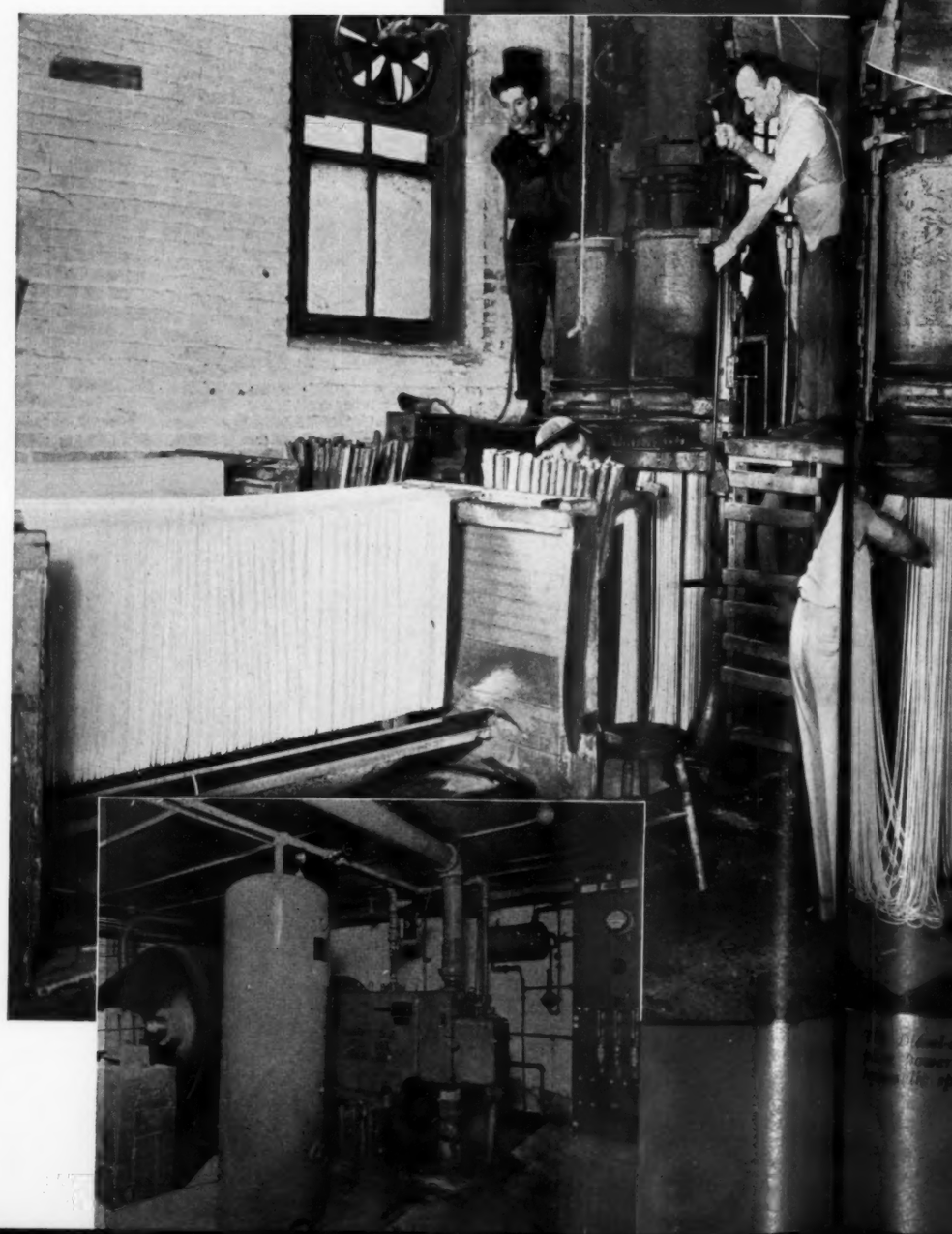
A word about macaroni making by way of explaining the rather heavy power consumption of this plant. The preparation of dough from Semolina flour is accomplished in motor driven mixers, after which the dough is forced through stone dies by hydraulic presses, under a pressure of 20,000 pounds per square inch, to form continuous macaroni, spaghetti, or noodles. The products are then hung in drying rooms where they remain from five to six days, depending on the relative humidity of outside air. Large motor driven blowers force air through the drying rooms twenty-four hours a day and this equipment must be kept going. Failure of the blowers for as much as one day would result in loss of the entire contents of the drying rooms. So it is seen that while the processes are comparatively simple, they do require not only a considerable amount of power but also a continuous, never failing, source of electrical energy.

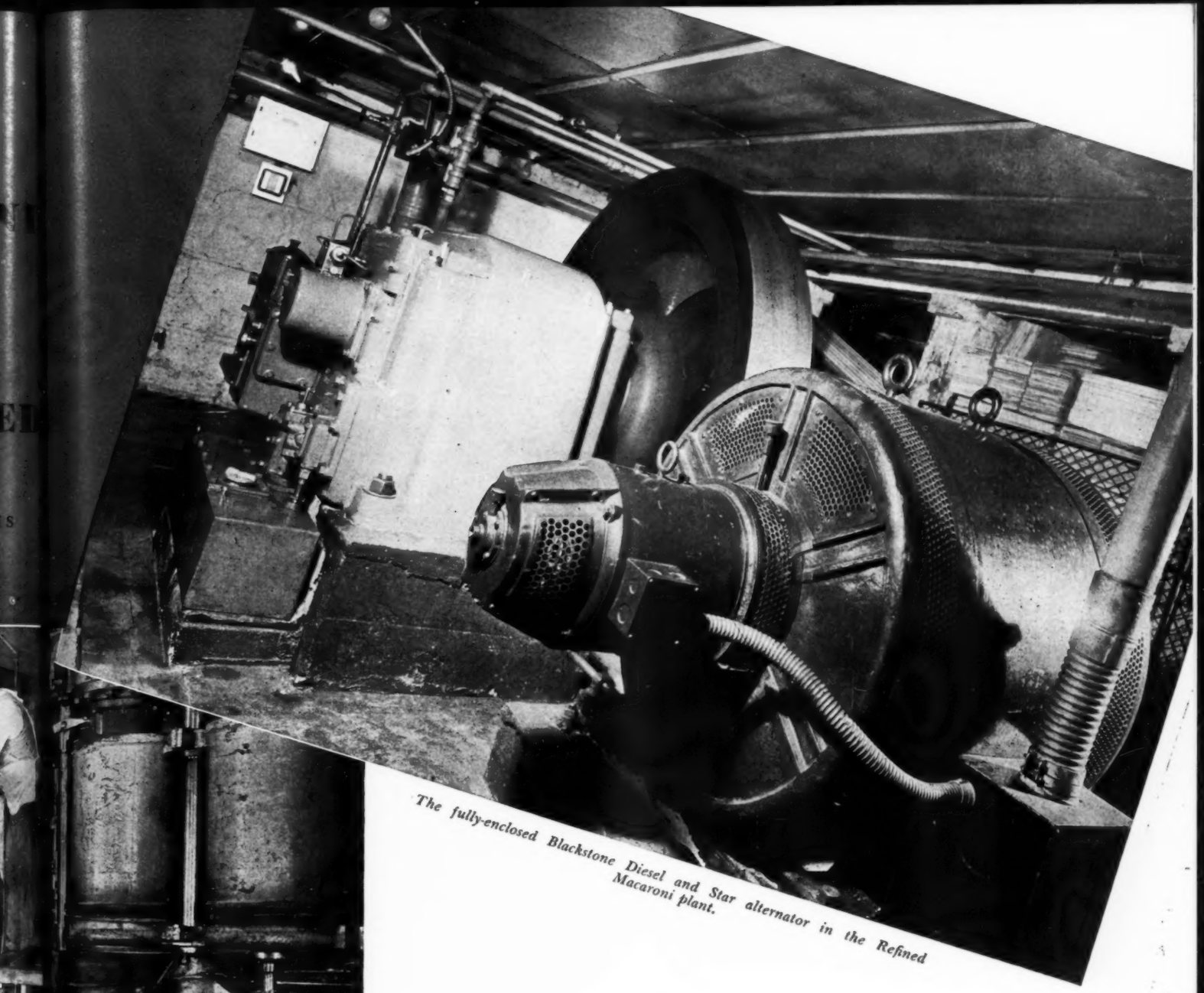
There were many Diesel installations in the vicinity of the Refined Macaroni Company rendering the same dependable service as this industry would require. Inspection of several of these satisfied the management that a Diesel would meet its requirements as to dependability and definite reduction of the power bills. Whereupon the General Diesel Power Corporation of New York was called in to study the situation and to select a suitable power plant.

One Diesel engine and generator to carry the spaghetti and macaroni making machinery, in addition to the drying rooms, was recommended. The lights, the elevator, and oil burner were to be left on a small segregated utility service at a cost of $25 per month until some time in the future, when the company would be interested in putting in additional Diesel electric generating equipment.

The basic principle behind this recommendation was that a Diesel engine should have a constant load close to its rated capacity to make it an economical investment. The load left for the Diesel was 70-80% of the engine's full load rating of 44 kw. for sixteen hours a day.

The plant was installed in an unenclosed basement corner about 15′ x 10′ in area. A Blackstone, single cylinder, horizontal, heavy duty, slow speed, Diesel, 12½″ bore, 15″ stroke, 70 hp. at 420 rpm., V belt connected to a Star 3 phase, 4 wire alternator easily carries this





The fully-enclosed Blackstone Diesel and Star alternator in the Refined Macaroni plant.

load. The slide base type alternator has a direct connected exciter and is rated for 75 kw. at 1200 rpm. It was oversized to provide additional generating capacity that would be available when a second engine is purchased.

The engine, alternator, and starting air tank are mounted on a cork suspended concrete foundation. A metal ceiling was placed over the engine to meet local code requirements. The auxiliary equipment and the switchboard are mounted at the wall. The engine is also equipped with Viking safety alarms and controls. Fuel oil is brought from the storage tank to a day tank by a Teesdale automatic transfer pump, and then to the Bosch injection system which is standard engine equipment. A Briggs model G-800 clarifier, mounted on the engine, is connected with the lubricating oil system for continuous lube oil clarification. Intake air is brought in through Maxim silencer. The exhaust is run underground to adjoining room where it passes through a Burgess exhaust Snubber before it enters the stack.

The engine is started and stopped by the plant machinist. At intervals during the day, some one checks on lube oil and cooling water. Aside from this routine, the engine is given a negligible amount of attention.

Operating cost for the first two months indicate that the plant will pay for itself in about 3½ years, and being of a trouble-free type, the owners should enjoy many more years of profitable service from their Diesel engine.

GULF COAST DIESEL TUG "DR. E. W. BROWN"

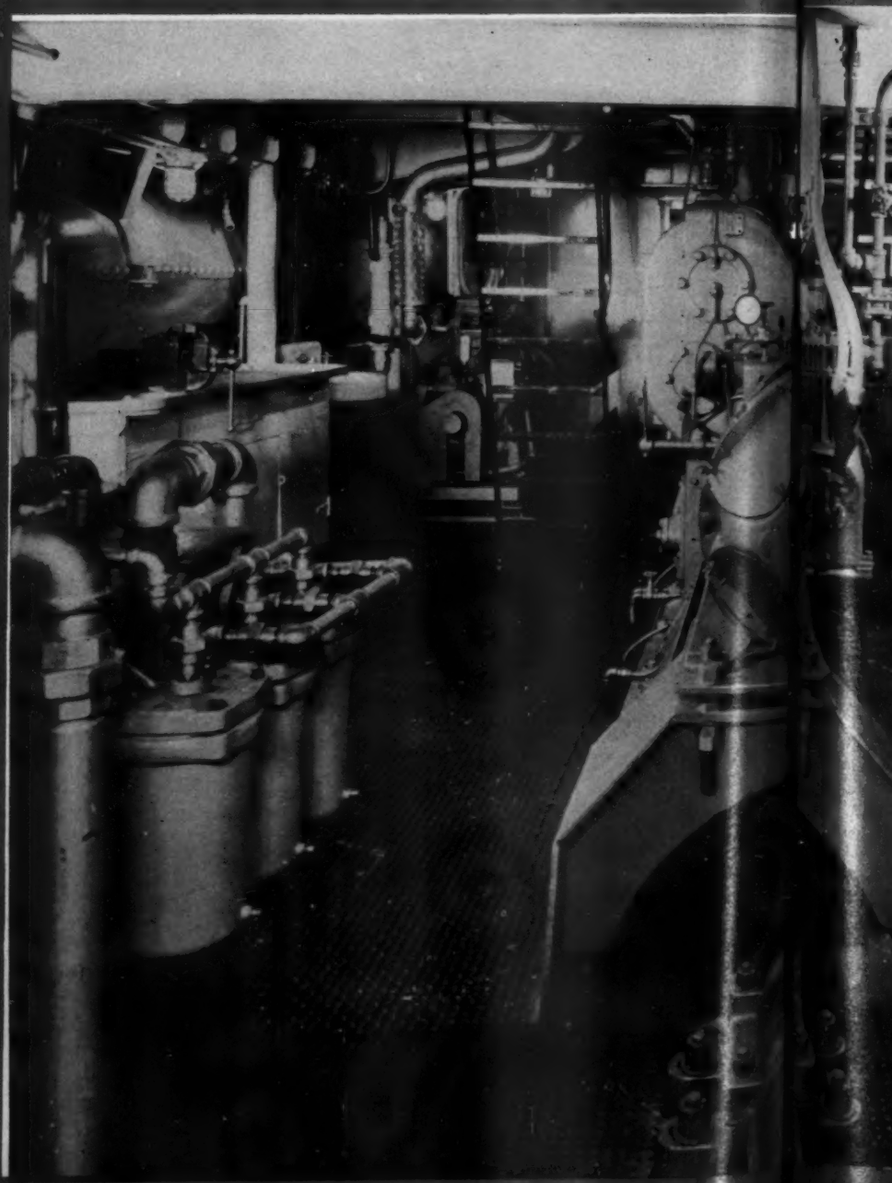
By WARREN GLEASON

ONE of the prominent Gulf builders, the Levingston Shipbuilding Company, with extensive yards in Orange, Texas, recently completed the tug "Dr. E. W. Brown", designed to be the flagship of the Higman Towing Company fleet, also of Orange, Texas, and named in honor of one of the prominent pioneers and developers of the great State of Texas.

The new boats "Hamilton" and "E. G. Diefenbach" for the Electric Ferries, Inc., of New York, were both constructed by the Levingston Shipbuilding Company.

The "Dr. E. W. Brown", with an overall length of 85′ and a moulded beam of 24′, is an impressive tugboat and a beautiful example of careful design and workmanship. Draft, maximum, with all tanks full, stores aboard and a full crew is 8′ 6″. Tanks are provided for 14,000 gallons of fuel oil, 200 gallons of lubricating oil, and 500 gallons of fresh water.

The tug is adequately powered and is driven by a full Diesel engine. Calmes Engineering Company of New Orleans furnished the Cooper-Bessemer Marine Diesel, direct reversible, eight cylinders, 13″ bore by 16″ stroke, rated 650 hp. at 350 rpm. That this engine is designed for heavy duty service is indicated by the crankshaft diameter of 9″, with the accompanying 9″ diameter of crankpins and main bearings. Piston pins, floating in the pistons, are of 5½″ diameter, bolted solidly to the piston-pin ends of the connecting rods, an exclusive Cooper-Bessemer feature designed to provide maximum bearing surface along the pin and also to make possible closer clearance between cylinder-wall and piston. Low piston-to-cylinder clearance is further provided for by the use of oil-cooled pistons and by the prac-



...d electrolytically tin-plating the Mechan... pistons used in the lower-speed engines, to ...vent seizing.

...injection is also a patented Cooper-Besse... development, the controlled-pressure, sys... which includes among other features a ...lief valve between injector and nozzle. With ...pressure relieved between injection periods, no ...ibbling ensues, and fuel savings result. With ...s freedom from exposed moving parts and ...ch cylinder-head covered with a dust-tight ...vering, the engine is unusually quiet in oper... ...ion and very trim and neat in appearance.

The governor is of Cooper-Bessemer design of ...djustable-speed, marine type. For regulating ...ngine speed, either the governor control or ...he hand speed-lever may be used. When speed ...s being controlled by hand, the governor may ...e set to prevent over-speeding.

...tandard Diesel fuel is used, filtered through the built-in Cooper-Bessemer filter; Dayton-Dowd pumps transfer the fuel from bunkers to day tanks. The lube oil cooler is also Cooper-Bessemer built-in, with a Briggs clarifier used for filtering. Cooling water is supplied by a built-in pump and another Dayton-Dowd pump; closed circuit cooling is employed, using a Young Radiator heat exchanger. The Pyrometer system is Wheelco, with a Burgess Snubber to muffle the exhaust; air-vent Packless tubing carries the exhaust to the stack.

Further equipment of this up-to-the-minute tug includes a full-Diesel auxiliary engine, a three-cylinder Lister, rated 30 hp. at 1200 rpm., direct connected to a Westinghouse 20 kw. generator. Batteries are Exide 110 volt, supplying not only the auxiliary machinery and the ship's lighting system but also serving to start the Lister Diesel through a starting winding fitted to the generator. The Calmes Engineering Company, Cooper-Bessemer distributors, also distribute the Lister Diesel units and have made many satisfactory installations in the Gulf section. In other departments as in the engine room, the "Dr. E. W. Brown" is just as well engineered. Steering is by Bollinger compressed air gear.

The galley is resplendent in stainless steel throughout and equipped with an Elisha Webb oil burning range. All quarters are heated by an automatically controlled York, oilburning, steam heating system; living quarters are cork-insulated to U. S. Coastguard specifications. Crane valves are standard aboard, and the Westinghouse-equipped switchboard in the engine room is of the most modern type.

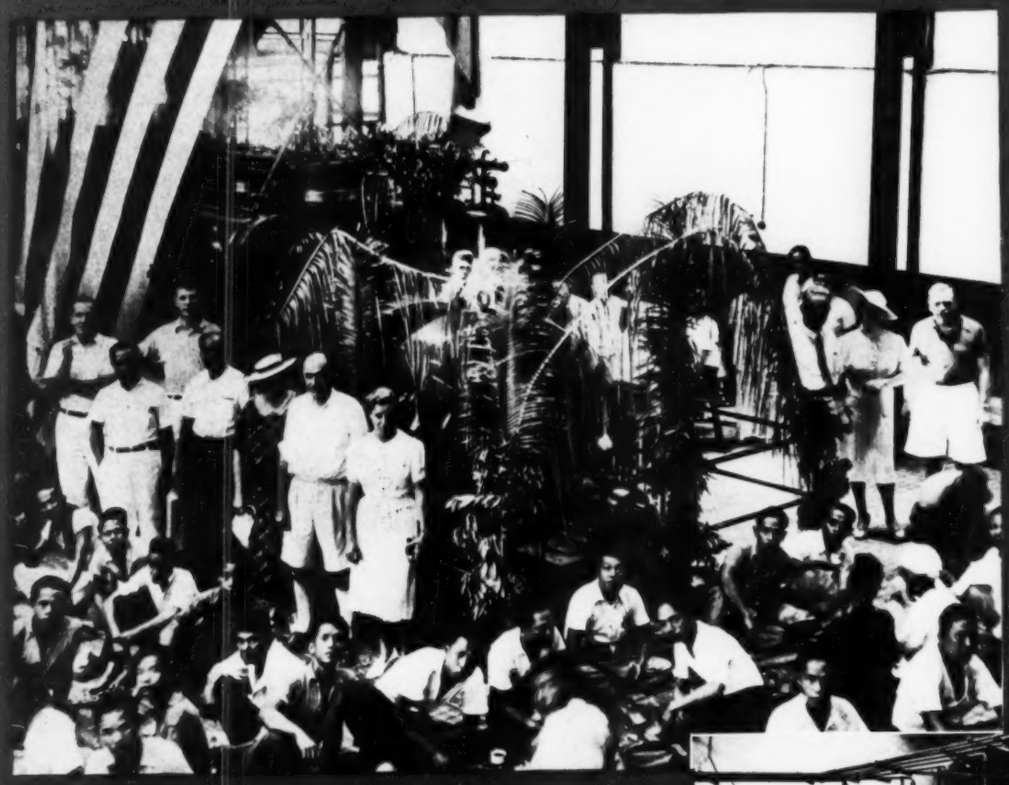
Comfort in the pilot-house, aside from ample steam heating for chilly weather, is also assured by weather-proof windows with all-brass sash, manufactured by the Kearfoot Engineering Company, Inc., of New York. All in all, the Higman Towing Company may be proud of its new flagship.

↑ *The Westinghouse equipped switchboard.*

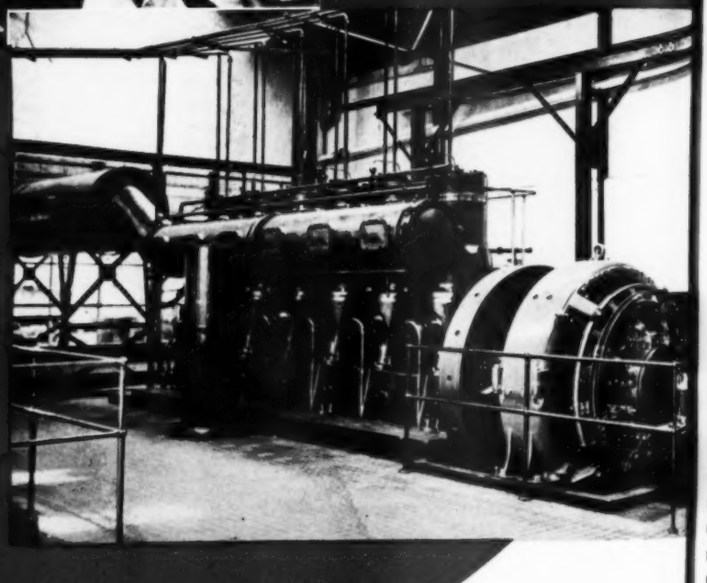
← *View of the roomy machinery space showing aft end of the propulsion engine and shaft generator center.*

↓ *Port side of the main Diesel with the auxiliary Diesel showing extreme right.*

"SELAMATAN" FOR NEW DIESEL



Native Sumatran Ceremonial



SOMEWHAT like their white brothers of the Occident who hold "open house" when a new municipal Diesel-electric light plant is dedicated with a formal opening, the natives of the far distant East Indies hold a celebration or "selamatan" as it is called, on similar occasions. Only recently a new 450 hp., Model 32E14 Fairbanks-Morse Diesel engine for driving a 300 kw., 230 volt dc. Crocker-Wheeler generator in a plant of the Holland-American Plantations Company, Sumatra, N. E. I., was the center of such native devotion. To assure the successful operation of this new equipment in the plant, the native operators held certain sacrificial rites over the shiny new Diesel and generator. This "selamatan" ordinarily consists of the sacrifice of a number of water buffaloes and the burial of their heads at strategic points in the vicinity of the new engine or unit of machinery, and to round out the festivities the flesh of the buffalo is eaten at a "machan besar" (barbecue) in the engine room. Actually in this particular case, the sacrifice of the water buffaloes did not take place, as the burial of the heads, to be effective, would have required a place very near the engine. This being impractical, it was decided by the leaders of the natives that the heads ceremonially buried outside the factory power building would serve the purpose for all apparatus contained in the building. The "selamatan" was held and the engine and generator prepared for the ceremonial. In the illustration showing the natives, the mechanical workers are assembled at the "selamatan" which is also attended by the plant officials and their families. While the Fairbanks-Morse Crocker-Wheeler generator set shown in the illustration is the first of American make to be installed in this plant, the pictures clearly demonstrate the warm welcome accorded this pioneer American Diesel-electric generating plant.

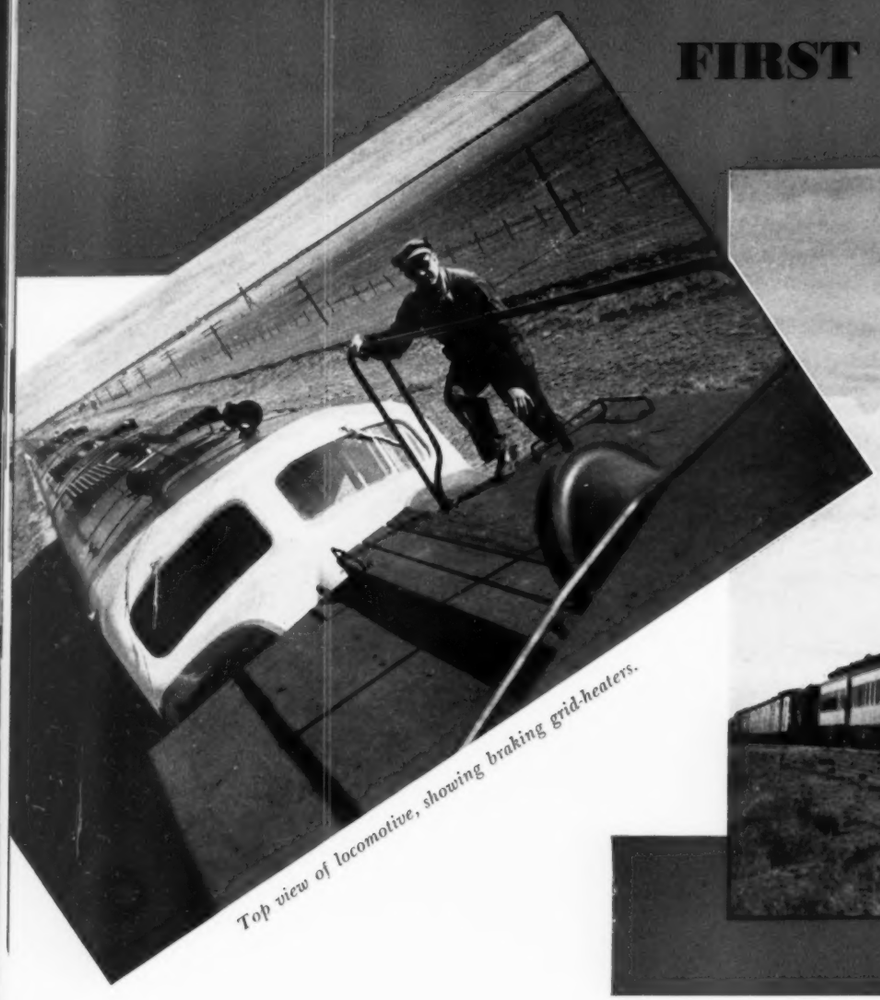
THE MEN BEHIND THE DIESELS YOU BUY

CLESSIE LYLE CUMMINS

President, Cummins Engine Company

★ Probably no one has so continuously slept, eaten, and travelled with internal combustion engines as Mr. C. L. Cummins. He grew up with early air-cooled, one lung, buggy-type cars, being connected with the American Underslung Company of Indianapolis and the Reeves Pulley Company of Columbus, Indiana. In 1913, Mr. Cummins organized his first company with the avowed purpose of inventing an engine that would run on anything except gasoline. The Cummins Machine Works took on all kinds of experimental and development jobs. Anyone with an idea that they wanted worked out was welcome. Experimental engines of different types were built up to 1918 when the Cummins Engine Company was organized to develop and build Diesel engines exclusively. With the development of an entirely new single metering pump-distributor type fuel system, Mr. Cummins felt that he had found what he was after . . . a practical automotive Diesel. In fact, it might well be stated that Mr. Cummins is the father of the automotive Diesel engine in this country. Certainly he pioneered the successful application of Diesel engines in trucks, in buses, and in many other types of mobile equipment. In 1929, he installed the product of six years of experimentation in Diesel engines under the hood of an old Packard car and, with $1.38 worth of fuel, drove from Columbus, Indiana, to the Grand Central Palace in New York where he created somewhat of a furor during the Automobile Show which was running at that time. That same year he ran a Diesel-powered car on the beach at Daytona under the eyes of the A. A. A. checkers at a speed of better than 83 miles per hour. During the two following winters, 1930-1931, he ran additional tests at Daytona Beach and ran up a record of 100 miles per hour with a Diesel automobile. He entered the first Diesel racing car in the Decoration Day race in Indianapolis in 1932 which was the first car ever to finish the 500 miles without stopping for fuel or mechanical trouble. In 1932, in August, he made the first coast-to-coast Diesel run in an Indiana truck equipped with a four cylinder Cummins. In 1933, he made a coast-to-coast run in a standard bus, with a six cylinder Cummins Diesel, with a running time of 72 hours and a total fuel cost of $22.00 and then, to top it off, in 1935, with a six cylinder Cummins engine and an Auburn chassis, C. L. Cummins made the epochal trip from New York to Los Angeles for a total fuel cost of only $7.63. Step by step, Mr. Cummins has demonstrated the economy, efficiency and dependability of the Diesel engine to which he himself has contributed so much in the last thirty years.

FIRST DIESEL LOCOMOTIVE



Top view of locomotive, showing braking grid-heaters.

View of the Santa Fe Diesel freight locomotive in its final test

By CHAS. F. A. MANN

NOT since the original Burlington Zephyr started its first test run as America's first Diesel railroad passenger train six years ago has there been another "Grade A" Diesel landmark.

February 4 and 5, the World's first mainline Diesel freight locomotive began its westward trip at the head end of a 3,000 ton freight train, over the Santa Fe system between Chicago and Los Angeles. The last part of a three-cornered chapter in the Dieselization of American railroads was completed at Los Angeles February 8 when the big EMC locomotive, with its four 1350 hp. units clicking like the proverbial Swiss watch, rolled to a stop in the Los Angeles yards, just 72 hours out from Argentine Yards, Kansas City, 1,782 miles away, and boasting of a record running time of 55 hours, the difference being consumed in side trips to Topeka and many spots to let local people inspect the latest Diesel creation.

The Santa Fe system gains the honor and distinction of the World's first railroad to employ Diesel freight, passenger, and switching locomotives, each part of this three-cornered development in Diesel history representing years of planning, huge investment, and foresight of a brand peculiar to the Santa Fe organization ever since it was founded in Kansas over 60 years ago. The Santa Fe now has two of these giant 5,400 hp. freight Diesels, 23 passenger Diesel units and 43 switcher units, making it the largest operator of Diesel locomotives in the world, with nearly 90,000 installed horsepower and a large block now on order.

The special party over the Santa Fe, to christen the new locomotive properly, was in charge of M. L. Lyles, Assistant to the President, of the Santa Fe System, and Volney B. Fowler, Public Relations Director of the G. M. Diesel group. The route actually started at Shopton, Iowa, on the banks of the Mississippi, via Argentine Yards at Kansas City, Emporia, Elinor, Wellington, and the Southern Line via Waynoka, Oklahoma, Amarillo Texas and Clovis, New Mexico, and via the main line West through Gallup, Winslow, Needles, and Barstow, Cal. This route is the regular through freight line of the Santa Fe, having gentler grades and fewer fast passenger trains to interfere. Besides, it pierces a much more fertile territory where freight is originated than the northerly and more mountainous line via La Junta and Raton Pass, on the Colorado-New Mexico line.

A dynamometer car was hooked on at Argentine and a careful check of operations kept on continuous tape recorder from the time the sixty car train cleared Kansas City until Los Angeles was reached. Only at Barstow, where certain Trainmen's agreements prohibit more than fifty cars, was the tonnage reduced, and this for only a short ride over Cajon Pass into San Bernardino and Los Angeles.

On uphill pulls, the Diesel locomotive reached close to 200,000 lbs. drawbar pull, far in excess of the maximum pull of a steam locomotive. At one period, a whole unit was shut down, due to a minor failure of a cylinder liner and piston, and for several hours the train made schedule with but three of its four units operating. On a bad hill, with the train strung out over three sharp curves, a "Brakie" in a rear car, far back, out of sight, pulled the air, and the Diesel was dragged to a complete stop, with airbrakes locked on over half the train. The enormous added load nearly pulled three drawbars, but not even a wheel slip was noticed. T
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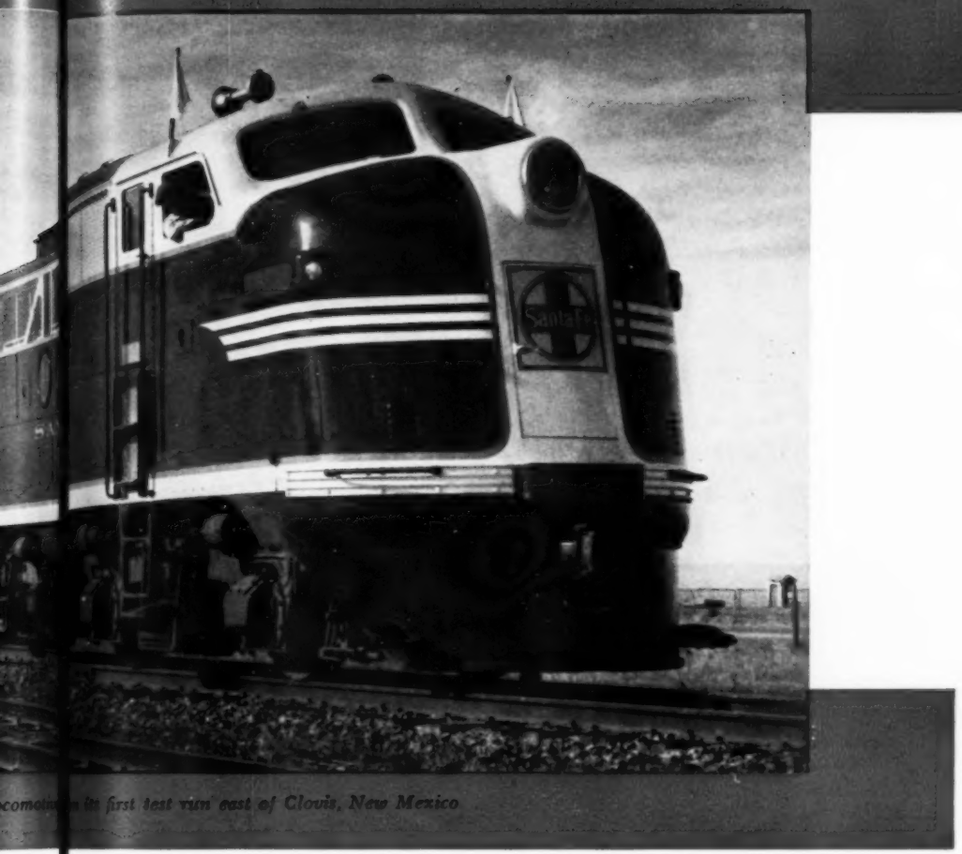
IPLETES TEST RUN ON SANTA FE



its first test run east of Clovis, New Mexico

noticed. The four air compressors, directly connected to each of the four main Diesels, kept the trainline pressure so high that its sudden drops and surges, when the "Brakie" was letting out the air, was scarcely noticed.

With steam operation, a sixty car freight will maintain a speed of from twelve to fifteen miles per hour. With the Diesel, it was from twenty-two to twenty-seven miles per hour. Downhill, due to the sensationally perfect performance of the regenerative braking system, or "Dynamic" brakes, as Electro Motive calls them now, a speed of close to twenty-five miles per hour was maintained, with no stops to cool the brake shoes off. The Diesel engines ran practically constant, with no shutdowns, clear from Argentine to Los Angeles. Rarely did the "Hot Engine" alarm sound, nor did any other failure except the damaged liner, develop worth noting. The engines ran at constant temperature with no auxiliary trouble of any kind, other than a brief plugging of an oil filter.

The sensational development on this locomotive, one designed primarily to increase freight-haul efficiency over the stiff Western mountain grades, was the Dynamic braking system, which got its first try-out on this impressive test run. Briefly, the system consists of a control lever, contactor panel, lockout switch, two sets of electric grids or heaters mounted in the roof, each side of the engine manifold, and a cooling fan with two blowers to blow fresh air through the heaters which dissipate the electric energy generated on a downhill run.

When starting downhill, the control lever locks out the Diesel generator circuit and converts the traction motors to generators. Automatically, the blowers start operation, using currrent generated by the traction motors. As the speed increases, the retarding power of the reverse-circuit motors increases, thus braking the train and reducing brake applications to a bare minimum, except on the steepest grades where the retarding effort, due primarily to difference in efficiency of the motors when operated as generators, makes it necessary. In position One, the buffing or retarding pressure is 35,200 lbs. at a speed of twenty-nine miles per hour, with a total of 2730 hp. generated to retard the train. In position Two, at twenty miles per hour, the buffing load is 48,000 lbs. with 2,500 hp. generated to hold back the train. On four sections of line, averaging twenty miles each, in total distance, or a total of 83 miles, the new braking system was successfully used. Cool brake shoes, no ruined treads on boxcar wheels, elimination of flat wheels and heat damage, faster operation downhill, and no long stops to cool wheels were the advantages.

Approximately 3,500 lbs. of weight per unit, 14,000 lbs. in all, were added to total weights of locomotive because of this system. The extreme roominess of EMC engine cabs makes it possible to install these electric brakes with no diminishing of space inside the cab. Thus, by simply utilizing the ability of the motors to function as generators on a downhill pull, one of the greatest problems of freight train operation has been solved. Heat formerly wasted ruinously at the brake shoes is now harmlessly blown into the air from the heater grids on the locomotive roof.

Normal freight train operation between Chicago and Los Angeles calls for 34 to 36 stops for fuel and water, with nine changes of locomotives. The Diesel test run, with the same load, used but one locomotive and made only five routine stops for fuel and water. Thus, the Diesel reduced the fuel-water stops from 36 to 5 OR ONE SEVENTH.

Electric braking reduced number of airbrake applications to only ONE-FOURTH as many as would normally be needed, and at no time did the temperature of car or locomotive wheels exceed 130 degrees, or a trifle hotter than sun temperature.

Total energy absorbed by the retarding brake during its use was 19,700,000,000 foot pounds or approximately 10% of the energy used to move the train on the entire run: ALL BECAUSE DIESEL LOCOMOTIVE FLEXIBILITY HAS ITS UNIQUE AND SUPREME ADVANTAGE OVER STEAM. No other form of motive power can compare with this single, vital factor.

Comparative operation over the entire run with nine steam locomotives, would raise the fuel cost for oil and coal to approximately $1,100. Total water for radiator makeup was less than 700 gallons, as compared with 750,000

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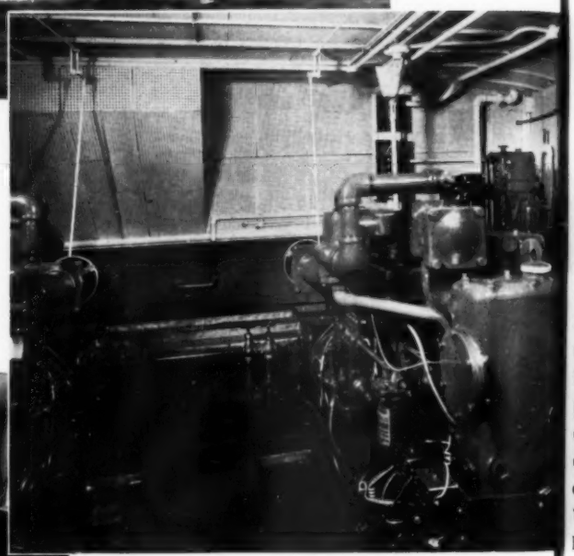
BURGER DIESEL YACHT

By
DOUGLAS SHEARING



Engine room view showing one of the Buda Diesels. Note insulation on ceiling and walls.

View of the spacious deck house looking forward.

ONE of the finest yachts to go into commission last summer on Lake Michigan was recently launched at the Burger yards at Manitowoc, Wisconsin. She is distinctly a modern motor yacht, the most modern of her features being the welded steel hull. Built for a Chicago yachtsman, this handsome craft is fundamentally one of the Burger line of standardized steel "54's", with modifications based on the owner's tastes designed by Frederick Lippold.

The new boat exhibits some distinctive and striking features. A conical bow and smartly raked stem, cruiser stern and after cabin sides flush with topsides are distinguishing features of the hull. The practiced eye senses in the expertly welded hull a feeling of substantial construction and seaworthiness without sacrifice of beauty. The deckhouse and after canopy have smartly raked windshields, with roomy settees forward of the deckhouse and a protected settee under the canopy. There is also a large roomy semi-circular cockpit directly in the stern. The tripod mast adds a smart naval touch to the whole.

The propelling engines are two 135 hp. Buda Diesels located in a well-insulated compartment, having full headroom and space for auxiliary machinery without crowding. Hull and deckhouse are completely insulated for heat and sound. Dex-O-Tex, a new non-slip resilient composition material is laid over the sub-steel decks, furnishing a sure grip whether dry or wet. Navigating controls are located in the deckhouse, and permit complete maneuverability from that station.

Owners and guest staterooms each with separate bath, lay aft. Staterooms, as well as deckhouse, are finished in primavera with natural maple trim. The bathrooms, including the crew's, and the galley are finished in Formica for perfect sanitation. The galley forward has an electric refrigerator and four-burner bottle gas stove. Accommodations for the owner's party are for six and the crew's quarters sleep two in separate sections or spaces in the forecastle.

Plant Maintenance and the "Maintenance Log"

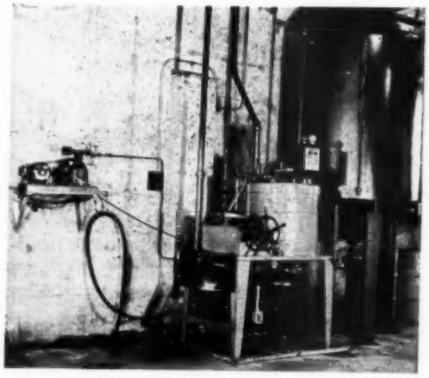
By R. L. GREGORY

MAINTENANCE, and its attendant problems, is of vital importance to the plant engineer at all times, but particularly so at present. The facilities of our equipment factories are being taxed to the utmost by our National Defense program, thus causing delayed and uncertain deliveries, and trends toward higher prices in the matter of repair parts.

The inherent characteristics governing the Diesel and its operation are dependent on many factors outside of the integral parts of the unit. Consequently, these outside factors have an important bearing upon plant maintenance. Let's take the problem of fuel as an illustration. We are all aware that there are many grades of fuel, which are applicable to Diesel use. Too many plant supervisors are prone to use and experiment with cheap grades of fuel, in order that they may keep the cost of fuel per kw. generated, at a minimum. In other words, this seems to be their objective. When a unit is new or after a thorough overhauling, and the tolerances of the various parts of the engine are correct, a plant may be able to obtain a good degree of efficiency on a cheap grade of fuel. This has been found to be the case, more so on the solid injection Diesel than on the air injection type of engine. But, sooner or later, difficulties begin to arise.

These cheap grades of fuel contain many foreign substances, such as ash, sulphur, etc., in quantities that are injurious to the mechanical parts of the unit with which the fuel comes in contact. The engineer finds that he is experiencing excessive wear in his fuel pumps. Fuel nozzles give trouble and excessive ring, piston and liner wear is in evidence. In order to keep up the efficiency of the unit, replacement of these parts become more frequent, and maintenance costs increase to such an extent that the savings which he has effected on fuel costs are soon wiped out. On this basis, the use of such fuel appears to be false economy. There are many grades of good fuel oil, obtainable at a reasonable cost, which, if used, will eliminate this excessive maintenance and still give a satisfactory cost in fuel per kw. generated.

Then there is the matter of lubricants, in which the same principles hold true. No other single piece of motive equipment requires the varied assortment of lubricants that a Diesel does. The prime purpose of any lubricant is to minimize friction and excessive wear. With the many moving parts incorporated in the Diesel, therefore, great care should be used, not only in the selection of the lubricants, but also the condition in which these lubricants are kept. Many plants use oil reclaimers and continuous filtration, while others employ the batch method of filtration. The accompanying cut shows most of the equipment as used in this latter method.



In this particular setup, two tanks of 1000 gallons capacity are used; one for dirty oil is placed in the basement adjacent to the filter as shown. The other is placed above the Diesel and contains the clean filtered oil. Periodically the crankcase of a unit is drained, the contents being drawn off into the dirty oil tank. The crankcase is then cleaned and refilled with filtered oil which flows into it by gravity. As the plant personnel has time, the dirty oil is filtered, after which it is forced by compressed air into the clean oil tank above. A small air compressor capable of maintaining 50 pounds pressure is used for this purpose. This is shown to the left in the picture. Several units can thus be taken care of with this setup, so long as one extra complete oil change is available. The makeup in such a system amounts to about 5 percent per annum. In addition to this, the vendor of the oil makes periodical checkups on the oil to see that it is maintaining its characteristics. Such care is extremely helpful in lessening maintenance. So much for factors outside of the unit itself.

When it comes to the maintenance of the mechanical parts of the Diesel itself, one of the most helpful assets is a good "Maintenance Log". This log, religiously kept, is of more import to the plant engineer than his daily operating log. When used in conjunction with periodical and systematic inspection of your units, it accomplishes two things: First: It should be a complete record of all maintenance and repairs. If kept up-to-date, the plant engineer can soon detect whether any particular part or piece of equipment is requiring excessive maintenance. If he finds this to be the case, then it is up to him to eliminate the cause. As a typical example of this, I recall a case wherein it was found that the maintenance crew was having to replace several strip valves and springs each week on the scavenger pump of an air injection type engine, due to breakage. These valves, seats, and springs were inspected. The valves were made of high-grade material, were well seated, and the spring tension found to be adequate for proper valve performance. They did not stand up, however, for the valves would break, get crossways of the plates, and break the springs. Upon "miking" the valves they were found to be .020″ in thickness and uniform. It was decided to replace them with valves of the same material, but .030″ in thickness in one valve section, and observe the results. This was done, and no trouble experienced with the replaced valves. Then all valves were changed, with the

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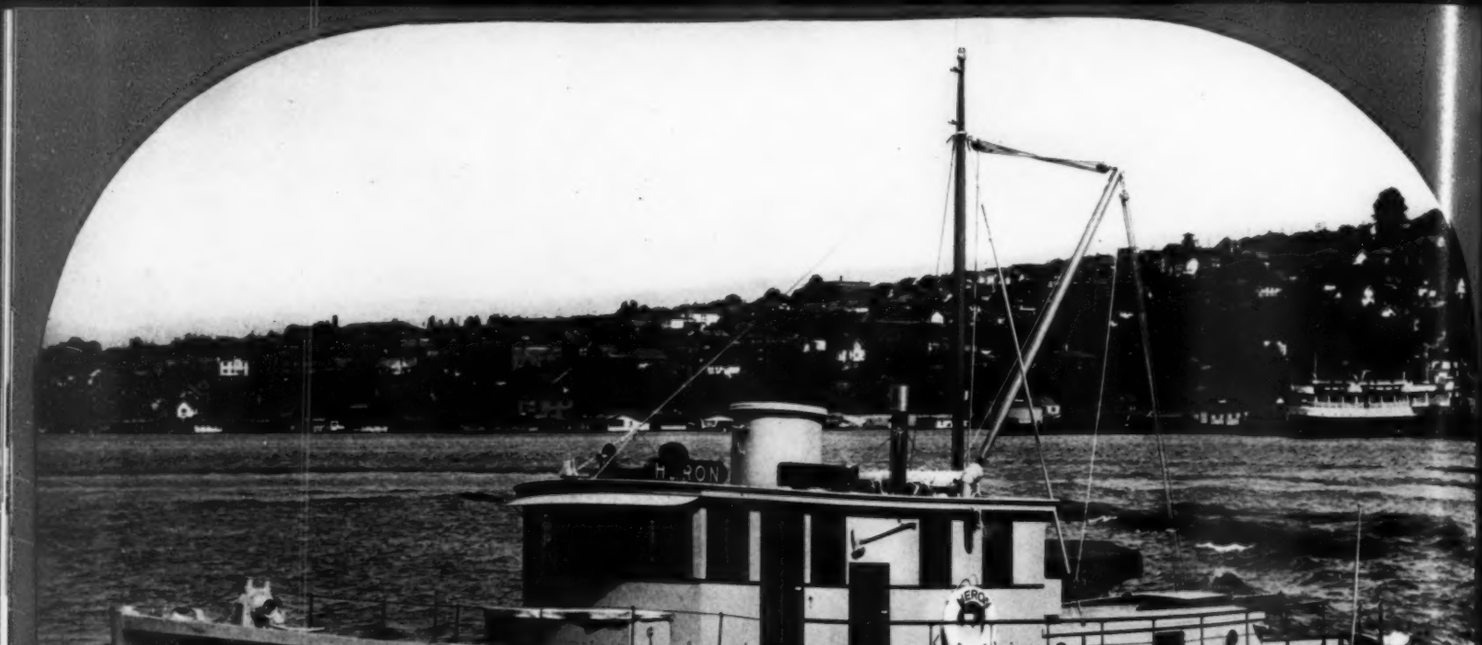


FISHERIES RESEARCH VESSEL

By JOHN E. HUBEL

THE adoption of Diesel engines as motive power for commercial fishing craft having become practically universal, it was only natural that when the Federal Bureau of Fisheries asked for bids on a specially designed vessel to be used for research purposes on the Pacific Coast, a Diesel engine was specified for this craft. The new vessel is being used for tagging and research work in the salmon and herring fishing waters of the Northwest. It has a cruising range of about 1,000 miles at a speed of eleven knots per hour, being equipped with fuel tanks having a capacity of 600 gallons. The registry records covering this vessel, named the *Heron*, give the following details: overall length 58.5′, beam 13.4′, draft 5.75′, gross tons 36.3. While several new features have been incorporated in the boat, it is the engine that is attracting considerable attention from fishing folk and others interested in modern motive power for vessels engaged in commercial fishing and for other purposes. A Murphy Diesel was chosen for this research vessel. The engine is of the full Diesel type, six cylinder, with a continuous rating of 135 hp. at an engine speed of 1,200 rpm. The engine is equipped with Twin Disc marine reverse and reduction gear with 2:1 ratio, giving a propeller speed of 600 rpm. Starting is accomplished by a Delco-Remy electric starting system, using a 32 volt starting motor and incorporating a 1,500 watt. 32 volt generator, providing capacity for charging the starting batteries and for operating running lights and other accessories. Provision has also been made for the convenient installation of a small air compressor when it may be required and a power takeoff clutch is built into the front end of the engine for handling net hoists and similar accessories. The vessel is fitted with the most modern equipment for U. S. Bureau of Fisheries' research work, the deck equipment including a Bennett electric windlass. The *Heron* was designed by Edward Monk, a Seattle naval architect, and the boat was built in the Olsen & Sunde shipyards.

"CAPE ALAVA" COMPLETED AT TACOMA

. . . . *Continued from page 27* . . . .

is supplied to assist in quick starting. Water softeners, salt water distiller, bilge water purifier and charcoal aerating filters are provided for the improvement of water handling and bilge water treatment aboard the ship. Two Worthington two stage, three cylinder air compressors driven by 50 hp. G. E. motors are provided for starting air, and two 4' x 16' air bottles are fitted. For long runs at sea, where starting air is not needed, a small Ingersoll Rand, two stage compressor with 5 hp. motor is used to make up losses from valves and ordinary leakage. The main engines have Hamilton air reversing mechanism and a Watson Flagg motor driven turning gear drive.

A three section Foster Wheeler steam generator is fitted for ships and bunker oil heating, operated both as a waste heat boiler from main engine exhaust gases and independently oil fired, with W. M. Best Engineering Co. oil burner, Calorex fan and pump unit.

Suitable Foster Wheeler condenser, hot well and accessories are fitted, including separate steam operated condensate, fuel oil and boiler feed pumps.

This completely electrified ship has two Washington Diesel engine generator sets for primary power. The Diesels are of the four-cycle, trunk piston, common rail type with a 12¾" bore and 16" stroke, delivering a maximum of 525 hp. at 450 rpm.

These twin Diesels are mounted on the machinery flat and have a completely independent system of fuel and cooling water circuits, self-contained water and oil pumps, and one or both of them will operate constantly, never ceasing their work from the time the ship leaves dock until it is scrapped. In port, both units will be operated, but during a normal running day, only one will be needed. Ross fuel oil heaters are used, Cuno oil filters, Scintilla injection pumps, Woodward governors and Ross heat exchangers. They are mounted on Korfund Vibro-Isolators and have Maxim spark arrestor silencers, and do not exhaust through the waste heat boiler.

Each Washington Diesel drives a General Electric three-wire D. C. compound wound 275 k.w. 12-/240 volt generator. A main switchboard layout, that would do justice to a municipal powerhouse, controls this current output and is all located on the control stand

level, in dead-front cabinets. Separate resistor houses are located on the forward and after deck for handling the deck machinery and cargo hoists. A 15 kw. four cylinder Buda Emergency set is fitted in the upper deckhouse for emergency lighting and control use.

The ship is divided into eight watertight compartments by seven transverse bulkheads extending to the main deck. A double bottom extends from the forward ballast tank to the concrete ballast space just forward of the propellor. Three large cargo holds extend from the forward deck down to the double bottom, reached through one very large hatch and two smaller ones, and all served by eight cargo booms and suitable hoists, all motor driven. The ship is equipped to carry big deck loads of lumber and heavy pieces, has no refrigerated space, and has heavy steel sectional outer hatch covers.

The engine space extends upward from a point just aft of the middle of the ship, with galley, crew's mess, etc., on the second deck; crew's quarters on the main deck; passenger and officers' cabins, dining saloon, and serving pantry on the boat deck. Two 25′ steel lifeboats are fitted on automatic davits here. Extremely large pilot house, equipped with fathometer, Sperry Gyro compass, automatic pilot, fire detection system, and a completely equipped (RCA) radio room; and the McKiernan-Terry Telemotor-Steering gear apparatus is, of course, on the bridge deck. The captain's roomy quarters and large office, replete with fireproof safe, and fan room aft, is also located here. Sturtevant fans and Trane heaters supply warm, fresh air to all quarters. The electrified galley, with tile, stainless steel trim and good ventilation, is a novel job for a cargo vessel.

A York ice machine supplies refrigeration to 2,000 cubic feet of ships stores, all lined with Armco metal, on the second deck, handy to the galley and crew's mess. The CO_2 Walter Kidde fire extinguishing system has a separate room for gas bottles on this deck, also.

Cape Alava sailed for the Orient on her maiden voyage under the American Mail Line flag and her operation as a fast, economical and very handy freighter will be watched with keen interest by the American marine and Diesel fraternity. Those "Dream freighters" we've long talked about are at last a reality. *Cape Alava* will gracefully fulfill the hopes and predictions of a sceptical America on the business of returning the American flag to the High Seas.

SUPERVISING & OPERATING ENGINEERS' SECTION

. . . . *Continued from page 47* . . . .

result that this maintenance was eliminated, and the life of the valves and springs greatly increased. What was true in checking up on this particular phase of maintenance also applies to most of the other parts of the unit, and eliminates the personal element of reliance upon memory instead of records.

Second: The maintenance log should also serve as a perpetual inventory of spare repair parts. A section of the log book should be set aside for the listing of all repair parts carried in

stock, their identification or catalog numbers listed, the amount on hand noted, and last but not least the engine data of the unit to which the parts apply recorded. Nothing is so exasperating, in case of an emergency breakdown, as to have to start looking for information of this nature, which should be right at one's fingertips. At present this is of vital importance, since in many plants the demands on existing equipment is so great as to limit the time for maintenance, and also because the procurement of repairs is becoming more uncertain daily. With this information at hand, the foresighted engineer will anticipate his needs, and have repairs on hand when needed.

It is always good practice to have an annual inspection of the various units in your plant. This inspection should be very thorough particularly with regard to the parts of the units which you cannot inspect in the time allotted to routine maintenance. It is well to give the pistons, liners, rings, bearings, fuel equipment, compressors, etc., a complete going over; checking up on the wear of these parts to maintain the tolerances of the manufacturer in making the equipment, so that it will give the best efficiency. This data should all be logged and, upon completion of repairs, it should be filed away for future reference and comparison in the next regular checkup.

ACKERMAN NAMED TO NEW POST AT DODGE

APPOINTMENT of J. R. Ackerman as Director of Merchandising and Advertising, Dodge Division, Chrysler Corporation, is announced by F. J. Poag, Assistant General Sales Manager. Mr. Ackerman has been associated

with Dodge for several years, formerly as a field manager and, until his present appointment, as Assistant Director of Truck Merchandising at the factory in Detroit, Michigan.

Ackerman has been engaged in the automobile business almost continuously for a period of more than twenty years. He has had production experience and is familiar with virtually every phase of motor vehicle distribution. Starting with an engineering education, Mr. Ackerman spent considerable time in the manufacturing end of the business. Subsequently he devoted several years to automotive service work and then entered the sales field.

During the first World War, Ackerman served as chief engineering officer of the USS *Savannah* attached to the 8th Division Submarine Force, U.S. Atlantic Fleet, operating twelve twin Diesel powered under-sea boats.

* * * * *

THE Navy Department has awarded a contract totalling $3,500,000 to the General Motors Corporation, Cleveland Diesel Engine Division, for the construction of propelling machinery for twenty-eight mine sweepers.

NEW DIESEL INSTRUCTION BOOK

THE Service Department of the Gray Marine Motor Company announces a 150 page illustrated book covering installation and operating instructions for Gray Marine Diesels. Size is 8½ x 11, with permanent binding and waterproof cover.

The first part of the book is devoted to the preparation of the engine bed, exhaust lines, fuel tanks, together with general instructions on installation problems which can apply to any engine, and which contain valuable information for boat builders. The second section is devoted to operating and maintenance data on Gray Marine Diesels.

This useful volume is authoritative and complete, and the company reports that many calls for it are being received from Trade Schools and Power Squadrons. Price is $3.00 postpaid. Order from Gray Marine Motor Company, 6910 East Lafayette Avenue, Detroit, Michigan.

SANTA FE DIESEL LOCOMOTIVE TEST RUN

. . . . *Continued from page 45* . . . .

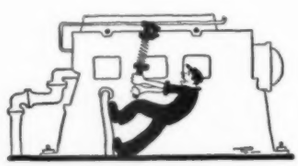
gallons that would be used for steam locomotive operation. And on the Santa Fe, there are 1,200 miles of route that water supply is almost as costly as fuel.

OPERATING PERFORMANCE:

Argentine Yard (Kansas City) to Los Angeles:

Distance, miles	1,782
Cars handled, maximum	68
minimum	49
Tonnage handled, maximum	3,150
minimum	2,262
Gross 1000 ton miles	5,181
Running time, hours	55
Average speed, mph. (running)	32.5
Maximum speed, mph.	73
Drawbar pull, lbs.	197,000
Maximum drawbar horsepower	4,400
Total fuel consumed (gallons)	10,750
Fuel per mile (gallons)	6.05
Fuel cost (cents, average per gallon)	4

The run ended at Los Angeles terminal at 9 P.M. Saturday, February 8, 1941, or almost exactly seventy-two hours from Argentine Yards, Kansas City, Missouri.



GENERAL Motors Sales Corporation has awarded a contract to the Pennsylvania Shipyards, Inc., Beaumont, Texas, for the construction of two 1000 hp. Diesel propelled tugboats. These vessels will be 100 ft. in length, with a beam of 25 ft. and depth of 13 ft. 6 in. and each will be 250 tons gross. They will be known as hulls 250 and 251.

NEW BARDCO CATALOG

AN eight page catalog, describing its automatic emergency standby generating plants, has just been issued by the Bardco Manufacturing and Sales Co. Entitled "When Split Seconds Count", it shows the various types of gasoline, natural gas, and Diesel engines driven Bardco generating plants that are used for hundreds of different standby services; such as, in hospitals, radio stations, and department stores, to provide emergency lighting in case of power failure.

Three seconds is all the time required between a power failure and the time that the Bardco standby plant is carrying the load. Automatic controls perform all starting and switchover operations, as well as automatically stopping the plant when normal power is restored.

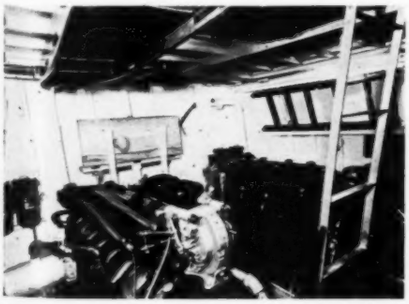
The Bardco Manufacturing & Sales Co. produces a wide range of automatic emergency and continuous duty generating plants, and the Bardco-Master series range in capacity from ½ to 200 kw. Many of the models are Diesel engine driven. Manufacturing headquarters are at Dayton, Ohio, and the Executive Offices at 4031 Goodwin Avenue, Los Angeles. Copies of the folder describing their emergency generating plants may be had by writing to the Los Angeles office.

NORDBERG SELLS TWO MORE 3,000 HP. DIESELS

NORDBERG Manufacturing Company reports orders for another 3,000 hp. Diesel for South Norwalk, Connecticut, a companion to the unit reported in the February, 1941, issue of DIESEL PROGRESS, and a similar engine for Rockville Center, Long Island.

SYNCHRO - MASTER SYNCHRONIZES TWIN MARINE ENGINES AND MULTIPLE UNIT INDUSTRIAL INSTALLATIONS

A SIMPLE device which is based on the principle of the automobile differential and which acts as a mechanical governor when connected to two or more engines is the Synchro-Master. According to the manufacturer's literature, Synchro-Master automatically synchronizes the engines, connected to it by tachometer cables, to the exact speed of the "lead" engine on which the device is mounted. Write Synchro-Master, Seneca Falls, N. Y., for literature.



This pair of Gray marine Diesels is synchronized by the unit, at center foreground, mounted on the "lead" engine.

TUG "ROSE REICHERT" REPOWERED WITH AN ATLAS DIESEL

THE Reichert Towing Line, Inc., operating a fleet of towboats in New York harbor, has awarded a contract to the Atlas Diesel Engine Corporation for a 6 cylinder, 13" x 16" Atlas Imperial 4 cycle Diesel engine and auxiliary equipment for the conversion of their steam tug *Rose Reichert*. This engine, rated to develop 400 hp. at 300 rpm., will be equipped with automatic air ram for single lever control for quick maneuvering and a Kingsbury thrust bearing will form an integral part of the engine bedplate. These features of the Atlas engine are of special importance in towing service.

While work preparing the *Rose Reichert* for the new engine and equipment will be started immediately at the Reichert Terminal, Foot of Dupont Street, Greenpoint, Brooklyn, N. Y., the installation is not expected to be completed before next July.

FOUR towboats are now being constructed by the Gulfport Boiler & Welding Works at Port Arthur, Texas, for the Navy Department. Each vessel will be 100′ x 24′ x 12′ and powered with a General Motors Diesel engine.

This yard is also building two other towboats; one for Deepwater Oil Terminals Co., which is to be 70′ x 18′ x 10′ and powered with a 400 hp. Atlas Imperial Diesel engine, and the other vessel of the same dimensions is for the Butcher Arthur Corporation.

* * * * *

THE yacht "Vema" has been purchased by the United States Maritime Service for training apprentice seamen. Formerly known as the "Hussar," this boat was owned by Mrs. M. M. Vetlesen and was bought for the nominal cost of one dollar.

This vessel was built in 1923 in Copenhagen and is powered with an 800 hp. Burmeister Diesel engine. The ship measures 240 ft. over all by 182 ft. on the waterline, and beam of 33 ft., draft 15 ft. and will be stationed at Hoffmann Island, New York harbor, going on weekly cruises. Her permanent crew will be four officers and fifteen men, her cruising complement will be 100 more apprentice seamen.

MC PHEE IS NAMED TO NEW POST AT DODGE TRUCK PLANT

APPOINTMENT of E. J. McPhee as General Superintendent of the Dodge Truck Division, Chrysler Corporation, is announced this week by R. H. Dragsdorf, Plant Manager.

McPhee has been Superintendent of Assembly since production of Dodge trucks started in the new Mound Road plant in September, 1938. He was one of a group of manufacturing officials who helped map production processes and lay out the Dodge Truck plant. Formerly he had been Chief Inspector of Production at the Chrysler Corporation Highland Park plant and Superintendent of Assembly at the Chrysler Jefferson plant.

A native Detroiter, Mr. McPhee has served continuously in the automobile business here for more than a quarter of a century.

SUPERIOR DIESELS RE-POWER FORMER NAVY TUG

"FALCON," formerly the Navy tug "Tadasco" of Charleston, S. C., has been repowered by the National Supply Co., with a Superior direct reversible 8 cylinder 14½" bore by 20" stroke, 360 rpm. main Diesel engine; two Superior Diesel auxiliaries; one 4 cylinder 9" bore 12" stroke, 175 hp. at 600 rpm., and one 4 cylinder 12½" bore, 15" stroke, 280 hp. at 400 rpm.

The converted clipper is owned by Captain Nick Dragich and his four brothers, all of San Pedro. They brought her out from the East coast for conversion at the Harbor Boat Company's plant at Fish Harbor.

LEVINGSTON Shipbuilding Company, Orange, Texas, has just been awarded a contract for the construction of a third 600 hp. Diesel-propelled towboat by the River Terminals Corporation. This boat is to be delivered next June and will be similar to two now being built at the same yard. All three ships will be single screw, equipped with Cooper-Bessemer Diesel engines.

PERSONNEL CHANGES AT ENTERPRISE

CAPTAIN C. S. McDowell, president and general manager of Enterprise Engine & Foundry Company, announces the appointment of Hans Bohuslav as vice president in charge of engineering, C. G. Cox as vice president in charge of sales, and C. M. Sayre as vice president in charge of production.

In announcing these appointments, Captain McDowell stated, "The high rate at which we are now operating dictates the necessity for the utmost efficiency in all departments of our business. The advancement of these three men to these positions will, we feel, help immeasurably in meeting the many new problems resulting from the requirements of the National Defense Program and the highly accelerated tempo of general business."

Mr. Bohuslav has been with the Company for eight years. Mr. Cox came to Enterprise in 1934. Mr. Sayre joined Enterprise in November, 1940.

In addition to the above, the appointment of B. Stockfleth as assistant to the president was also recently announced by Captain C. S. McDowell. Mr. Stockfleth was formerly with the Soule Steel Co. of San Francisco. Previous to that, he was with the George S. May Co., Industrial Engineers, of Chicago, and the International Harvester Company.

NEW GILLNETTER POWERED WITH A LORIMER DIESEL

POWERED with one of the new Lorimer 40 hp., 4 cylinder, 5¾" bore, 7½" stroke, Diesels, the 39 ft. gillnet boat *Stella Maris* has been delivered to Augustine Falcone, San Pedro, by the Genoa Boat Works, San Francisco. Of the raised forward deck type with pilot house amidships, the 12 ft. beam craft logs an estimated speed of 9 knots with her engine turning up 600 rpm.

THE "Rio de la Plata", the third of four new passenger liners now under construction for Moore-McCormack lines, was launched on March 1 at the Sun Shipbuilding & Drydock Company yards in Chester, Pa. She was sponsored by Madame Felipe Espil, wife of the Ambassador from Argentina to the United States.

The "Rio Hudson," "Rio Parana", "Rio de Janeiro", together with the "Rio de la Plata", are the first ever built with air conditioning in all cabins as well as public rooms, and all four ships will be powered with Sun Doxford two cycle, opposed piston Diesel engines. Starting in August, these vessels will enter the American Republics Line Service of Moore-McCormack and will travel between the east coast of the United States and the east coast of South America.

TWO NEW TUNA CLIPPERS GET SUPERIOR DIESELS

THE National Supply Co., Superior Engine Division, has completed the sale of two 6 cylinder, 12½" bore 16½" stroke, 465 hp., direct reversible marine Diesels to the Martinolich Shipbuilding Co., San Diego.

These engines will be installed as main power plants in the "St. Ann" and "Sea Wolf," 103 ft. tuna clippers under construction for local interests that will fish the craft in Mexican waters.

* * * * *

H. A. MARVEL Shipyard, Newburgh, N. Y., has been awarded a contract by the Meseck Towing Line for the construction of a tugboat 97' x 27' x 13.5'. This boat is to be powered with a Diesel engine.

* * * * *

A CONTRACT has been awarded to the R. T. C. Shipbuilding Company, Camden, N. J., for two more Diesel-propelled tankers for undisclosed interests. These will be 985 tons gross, 190' x 36' x 12' and will be known as hulls No. 138 and 139.

* * * * *

GENERAL Motors Corporation, Diesel Engine Division, Cleveland, Ohio, has been awarded a contract by the Navy Department amounting to $5,880,000 for furnishing propelling machinery for fourteen subchasers. They also received the contract amounting to $1,475,000 for furnishing propelling machinery and Diesel engine-driven generators for a submarine tender.

CATERPILLAR ISSUES NEW CATALOG

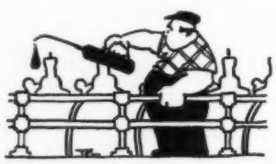
IN a 48-page catalog, just off the press, Caterpillar Tractor Co. has X-rayed its line of Diesel engines and has presented a detailed discussion of mechanical features and manufacturing methods.

The booklet, which is an unusually complete discussion of the whys and hows of Diesel engine design, makes profuse use of cutaway photographs. The various engine parts are treated separately. Crankcases, crankshafts, cylinder liners, cylinders, valves, timing gears, governors, fuel systems, etc., are accorded sections of the book, and the design and manufacture of each is discussed. There is a section of the catalog devoted to the horsepower ratings of the engines. Maximum, rated and continuous horsepower are tabulated for each model. Complete specifications, dimensions and performance charts are also given.

The booklet, which is printed in three colors, is available, free of charge by writing Caterpillar Tractor Co., Peoria, Illinois, and requesting Form 5850.

AN ATLAS DIESEL FOR NEW TUG

AN order for an Atlas-Imperial Diesel Engine was recently placed by Mr. A. G. Wilkerson, Tappahannock, Virginia, on behalf of the Massaponax Sand & Gravel Company of Fredericksburg, Virginia. This is a six cylinder 10″ bore, 13″ stroke, direct reversible marine engine rated 200 hp. at 325 rpm. and is intended for the 65′ tugboat now under construction by Mr. Wilkerson. When completed about May 1, the hull will be towed to Norfolk where the engine will be installed.



BOSTON AGENTS FOR MACK MARINER DIESELS

THE Rapp-Huckins Company, Inc., of 138-148 Beverly Street, Boston, Mass., has been appointed sole distributor of the complete line of Mack Mariner Diesel engines in the New England area. The firm's sales force, which has over 100 years' experience in the marine and stationary engine fields, is headed by C. H. Trombley.

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

Conducted by C. CALVERT HINES*

2,192,730

EXHAUST PIPE FOR INTERNAL COMBUSTION ENGINES OF AIRCRAFT

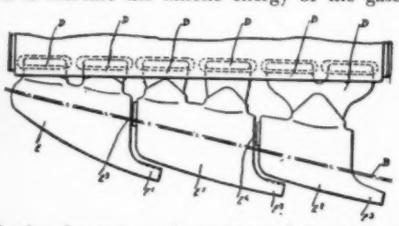
James Edwin Ellor, Derby, England, assignor to Rolls-Royce Limited, Derby, England, a British company

Application March 21, 1939, Serial No. 263,228

In Great Britain September 24, 1937

5 Claims. (Cl. 60—35.6)

1. In an internal combustion engine of an aircraft having at least one bank of cylinders and ports in the cylinders of the bank for the escape of exhaust gases therefrom, an exhaust discharge arrangement comprising a group of expansion boxes arranged one behind the other, pipes connecting said exhaust ports with the expansion boxes and nozzles discharging the exhaust gases from the boxes into the airstream passing the aircraft, the said nozzles projecting from the aircraft and pointing backward in the opposite direction to the direction of travel of the aircraft and each being tapered so as to increase the kinetic energy of the gases



leaving the same at the expense of the pressure of such gases, the group of boxes being shaped so as to prevent a flattened approximately streamline shape to the airstream through which the aircraft is traveling.

2,190,537

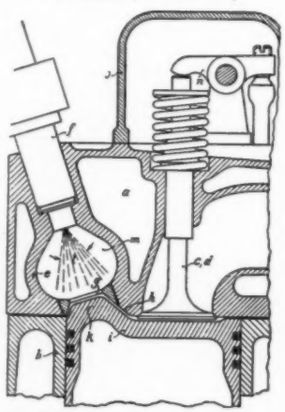
DIESEL MOTOR

Paul Wiebicke, Nuremberg, Germany

Application May 2, 1938, Serial No. 205,438

In Germany May 3, 1937

1 Claim. (Cl. 123—32)



A Diesel motor comprising a cylinder, a cylinder head, a piston reciprocable within said cylinder, said cylinder head having a substantially pear-shaped combustion chamber with its base towards the cylinder and a passageway af-

* Patent Attorney, 811 E. Street, N.W., Washington, D. C.

fording communication between said chamber and the cylinder, said passageway flaring toward the cylinder and, where it opens into said chamber, being of smaller diameter than said chamber, said chamber and passageway being coaxial with their axes intersecting the axis of the cylinder at a point remote from said head, a frustoconical projection on the piston to enter and to substantially completely fill said passageway when the piston is at its limit of outward movement, said projection being coaxial with the passageway at the limit of the outward movement of the piston and having its upper end face at right angles to its axis, and a fuel injection nozzle disposed to inject fuel into said combustion chamber from the outer end thereof and coaxial with said chamber, the combustion chamber being of a width greater than the jet of fuel delivered into the same by the fuel nozzle whereby, upon outward movement of the piston, air forced from the cylinder into said chamber counter to the delivery of fuel therein, causes the fuel to be spread throughout the combustion chamber and to become thoroughly intermixed with the air.

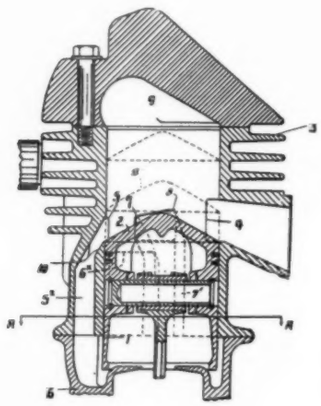
2,189,357

SCAVENGING OF THE CYLINDERS OF TWO-STROKE-CYCLE INTERNAL COMBUSTION ENGINES

William Cull, Shipley, England, assignor to Scott Motors (Saltaire) Limited, Shipley, England

Application July 12, 1939, Serial No. 284,060
In Great Britain February 23, 1938
4 Claims. (Cl. 123—65)

1. A combustion engine of the class described including a cylinder, a reciprocating piston mounted in the cylinder, said piston having a conical crown, an exhaust port leading from the cylinder, three transfer ports communicating with the cylinder, said ports being controlled by the movement of said piston, said cylinder having three spaced vertically disposed transfer passages, each passage being inclined upwardly and communicating with one of the transfer points, one of said transfer ports being disposed diametrically opposite to the exhaust port and constituting a central transfer port, the two other ports forming tangential ports disposed one on each side of the central transfer port, means for progressively opening the tangential transfer ports upon the movement



of the piston, and said tangential transfer ports facing the central transfer port so that the issuing gas streams are projected across the cylinder to impinge upon the stream entering the cylinder from the central transfer port at approximately the same angle as the conical piston crown.

2,187,856

INTERNAL COMBUSTION ENGINE

George Stephen Kammer, Budapest, Hungary

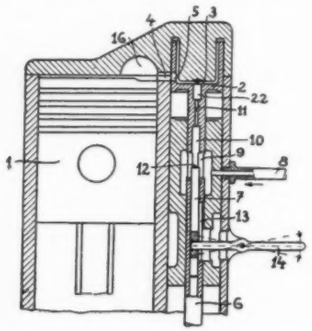
Original application August 18, 1937, Serial No. 159,777. Divided and this application January 31, 1938, Serial No. 187,998. In Germany August 28, 1936

1 Claim. (Cl. 123—33)

An internal combustion engine comprising a working cylinder and piston, a mixing chamber casing immediately beyond the working cylinder, a mixing chamber formed within said casing, a fuel jet terminating in said chamber, a member movable to vary the volume of the chamber and provided with a port to register in the minimum volume position with a passage communicating with the working cylinder, a rod connecting the said member to timed operating means, the rod being hollowed to form a fuel pump cylinder communicating with the jet, means for admitting fuel to the fuel pump,

DIESEL PROGRESS

a piston to cooperate with the fuel pump cylinder, and a member extending through the casing with one end cooperating with the piston



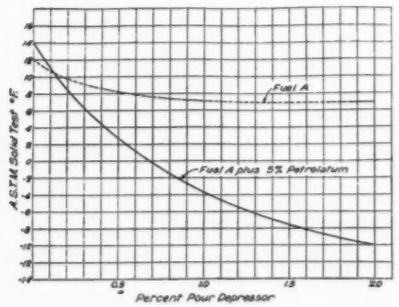
to hold the latter fixed in operation, the member being movable from beyond the casing to change the normally operative vertical position of the piston within the fuel pump cylinder.

2,177,732
DIESEL FUEL

Frederick H. MacLaren, Calumet City, Ill., assignor to Standard Oil Company, Chicago, Ill., a corporation of Indiana

Application May 27, 1937, Serial No. 144,976
7 Claims. (Cl. 44—9)

1. The method of increasing the pour point susceptibility of a narrow cut high speed Diesel engine fuel oil having an initial boiling point between about 400° F. and about 500° F., an end point between about 600° F. and about 700° F. and characterized by a difference in temperature between the 50% distillation point and the 90% distillation point of less than



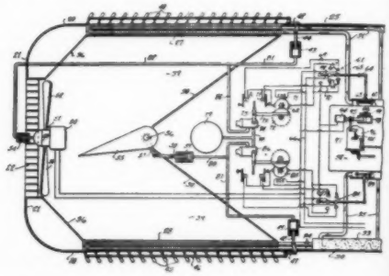
about 55° F., the pour point of which is normally not materially reduced by the addition of a pour point depressor thereto, which comprises adding to said Diesel engine fuel oil from about 0.2% to about 2% of a pour point depressor and from about 0.2% to about 0.8% of an amorphous waxy material, whereby the pour point of said Diesel engine fuel oil is substantially reduced.

2,189,888
THERMAL CONTROL OF INTERNAL COMBUSTION ENGINES

Louis E. Endsley, Pittsburgh, Pa., assignor to Fairbanks, Morse & Co., Chicago, Ill., a corporation of Illinois

Application February 7, 1938, Serial No. 189,110
20 Claims. (Cl. 123—174)

5. The herein described method of effecting a thermal control of an internal combustion engine provided with a water-cooling system and an oil-cooling system, each including a radiator, which consists in displacing air through a branched conduit, thence into cooling relation with the respective radiators; proportioning the effective flow of air in cooling relation to the respective radiators by control of the effective

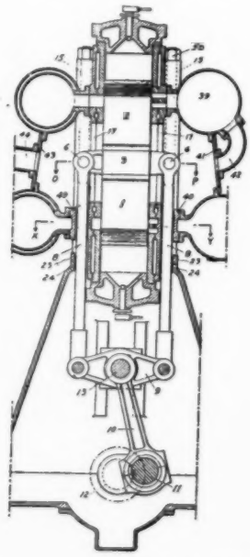


sectional area of the branches of the conduit; further proportioning the air by varying the delivery of air into the respective branches of the conduit all in response to thermal variations in the respective liquids to be cooled by the radiators, and further varying the displacement of cooling air in response to predetermined temperature variations of a relatively higher order, in one of said cooling systems.

2,184,093
DOUBLE-ACTING TWO-CYCLE DIESEL ENGINE

Charles G. Curtis, New York, N. Y.

Application April 3, 1937, Serial No. 134,708
7 Claims. (Cl. 123—61)



1. A double-acting engine having two single-acting cylinders and pistons working in opposite direction and mechanically connected so as to move together and by side rods outside the cylinder to a crosshead or yoke carrying the crosshead pin which operates the main connecting rod, such side rods passing through clearance holes in bosses formed in the scavenging passage so as to eliminate the packings at these points.